Heating and Ventilating

For Engineers and Contractors Controlling the Design, Specification, Installation and Maintenance of Heating, Ventilating and Air Conditioning

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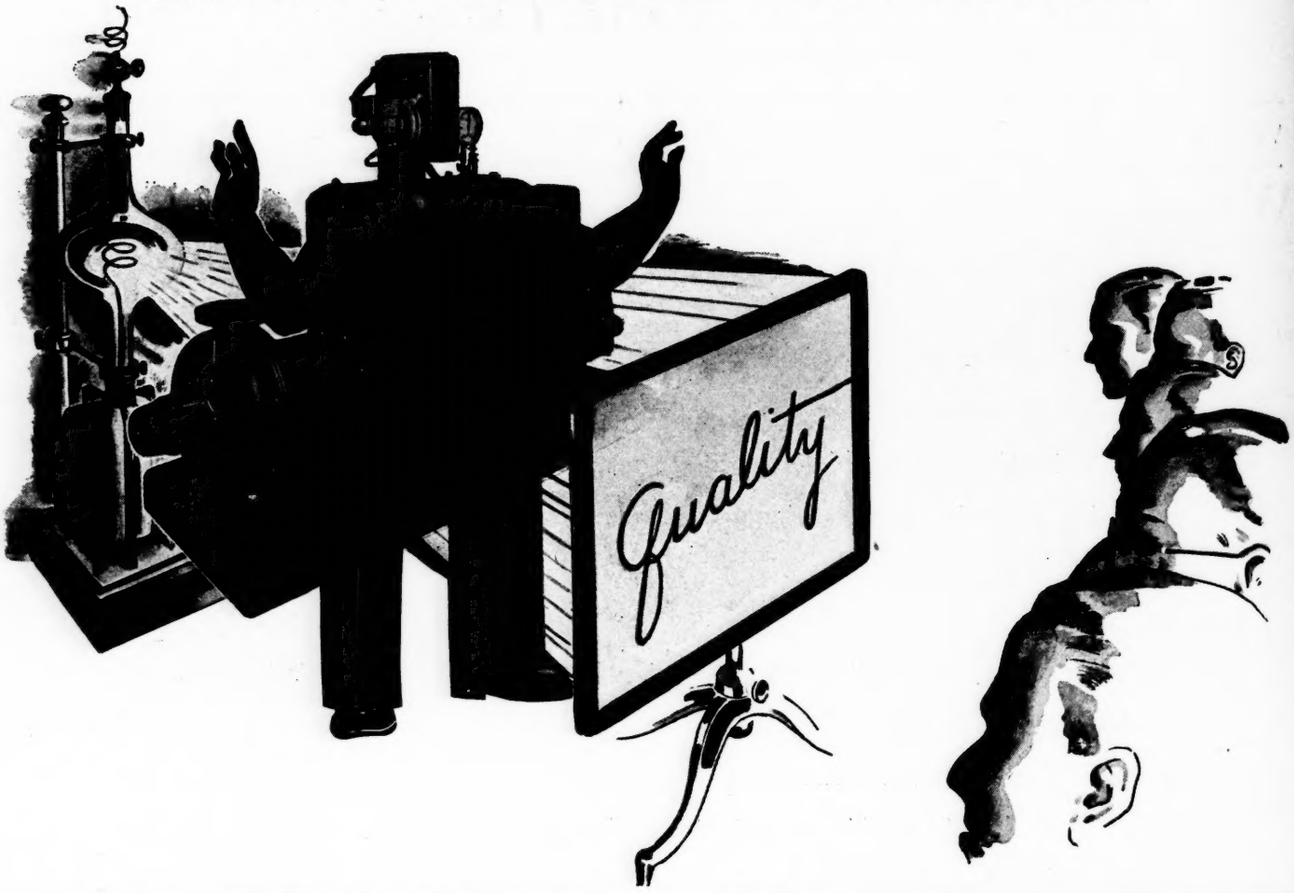

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THE NASH ENGINEERING COMPANY

SOUTH NORWALK, CONNECTICUT, U. S. A.

Mechanical Features of Modern Stokers for Automatic Heating

Compact and convenient tables covering a representative group of coal-burners, arranged for ready reference

WITH each new equipment development of importance there comes a time when our readers start writing in for information. When the sales of stokers, or coal-burners, as many now prefer to call them, started their upclimb about a year ago these requests began to arrive. Since then they have continued and the work included in replying to them led us to consider the desirability of classifying the burners and tabulating their chief mechanical features for convenient reference. Originally the idea was to use the tables for our own purposes only, but as the interest in stokers is still running high, parts of them are now being published.

With the large number of manufacturers, nearly all of whom offer a series of models and sizes, space will not permit publication of complete tabulations and it was decided to publish the tables only for the type about which our readers ask most often. This is the underfeed built as a "unit." These stokers have appeared on the market in large numbers and are roughly comparable with the factory assembled oil burner in that they are so arranged at the factory that field installation and engineering are kept at a minimum. In preparing the tables for use in this issue we have considered "unit" stokers to be those which (a) are essentially for heating as indicated by their size, design or statement of the maker; (b) operate with forced draft and include the fan as an integral part of the unit; (c) are normally equipped with controls and limit devices suitable for heating operation; (d) use the underfeed method of feeding coal; (e) reach the user as essentially a unit ready to be installed with but little assembly in the field. In this connection it is notable that as the size and capacity decrease, the tendency to make the stoker a merchandise package increases.

Stoker types omitted from the tables include the underfeed stoker, intended primarily for power boilers; overfeed stokers of the "throw-on" and the inclined grate type, both of which are built for either forced or natural draft; and the chain grate type. Our lists show only relatively few makers of these stokers who have designs intended primarily for use under heating boilers although many of them can be and are adapted for that purpose.

Another class of equipment not included in the tables is the stoker-boiler unit. This corresponds to the boiler-burner unit in oil-using equipment. Two makers have announced units of this kind—Spencer Heater Company and Electric Furnace Man, Inc. One of these—Spencer—builds a line of sizes of such units from 2250 to 40,000 sq. ft. of steam, while the other offers 3 sizes ranging from 700 to 1300 sq. ft. of steam.

Even with these omissions it was not feasible to make the listing complete. Instead it is intended to be representative. Turnover among the makers of stoker units is rapid and a good many make products for local distribution only. Some stokers have unique design or operating features. The tendency was to eliminate such stokers from the table, although this idea could not be rigidly followed, and some distinctive stokers are in the table.

Construction of the Tables

The tables were prepared from catalog data of the makers and each item was submitted back to the maker for checking. The assistance received in this phase of the preparation is gratefully acknowledged.

The column headed "Range of Maximum Capacities" needs explanation. All, or nearly all, stokers of this kind have some means of changing the rate of fuel feed. A given stoker can thus be adjusted to meet the fuel requirements of a particular job from month to month or day to day. Including a feed rate changing mechanism also lets the same model serve on installations of varying size. The on-and-off or stop-and-start system of controls is also common. The figures given in the column are pounds of fuel fed per hour when the stoker is operating continuously with the feed device set to give the fastest rate of feed possible. The range occurs because the lesser figure applies to the smallest size of stoker and the greater figure applies to the largest. It is thus evident that the range is not the range of capacity of any one stoker but is really the range of all the models referred to. The greatest figure gives at once the maximum capacity of the largest size stoker and evidently can be used to judge to how large a job the largest stoker can be applied. A similar estimate of the smallest job to which the smallest size can be applied is not obtainable directly from the smallest figure given in the column. Usually, by setting the feed mechanism to slow speed and using intermittent operation the smallest size can be applied to an installation considerably smaller than the low capacity figure given in the column would indicate. In practically all cases the various sizes are so built that they permit selecting a suitable size of stoker for any fuel rate falling within the range.

The figures for fuel rates are given in pounds per hour because this is the practice most widely used in the catalogs of the makers.

The column "Controls Available" means that the controls listed are those which either come with the

(Text continued on page 23)

REFERENCE LIST—HEATING STOKERS

M'FR. NO.	MODEL NUMBERS	NO. OF SIZES	RANGE, MAX. CAP'Y (LB. PER HR.)	TYPE OF FUEL BURNED	TYPE OF STOKER	CONTROLS AVAILABLE	REMARKS
1		8	Up to 50	Anthracite, Buckwheat or Rice	Underfeed, screw	Hold-fire time switch; Room thermostat; Stack limit and boiler controls.	Round retorts; Ashes removed by worm screw, and bucket type elevator to can; Safety shear pin; Gear transmission.
2	Worm Feed	5	8 to 300	Bituminous	Underfeed, screw	Automatic air regulator.	Domestic Model has round retort; Commercial models have rectangular retorts; Covered hoppers on all but Standard Commercial. V-Belt driven gear transmission.
	Hydraulic	12	250 to 2100	Bituminous	Underfeed, Hydraulic ram (oil)	Coal feed and air blast control; Vortex fan control.	Rectangular retort; Safety relief valve and pressure gauge on oil line; Ash is deposited on dead plates and removed by hand; Also side dump construction in all hydraulics.
3	B-75 C-450 B-150 C-600 B-225 C-750 B-300 C-1000	8	75 to 1000	Bituminous, nut and slack	Underfeed, screw	Variable feed rate; Air volume damper; Room thermostats; Pressure and temperature controls.	Rectangular retort; Ash removed as clinkers; Automatic motor cut-off and warning signal; Shear pin; Gear transmission.
	Domestic model 1, 1A, 2, 3	4	40-125	Bituminous	Underfeed, screw		Round and rectangular retorts; Automatic motor cut-off and warning signal.
4	Type C 30, 50, 75, 100, 150, 200	6	150 to 1000	Bituminous	Underfeed, screw	Variable feed rate; Automatic air control; Automatic pressure or water temperature regulator.	Rectangular retort; Ashes removed as clinkers; Overload shear pin; Gear transmission.
	Nos. 1, 2, 3	3		Bituminous	Underfeed, screw	Variable feed rate; Automatic controls; Hold-fire control.	Rectangular retort; Gear transmission; Covered hopper; Overload circuit breaker and cut-out.
	L.S.R. 4½' wide x 4½' long through 5' wide x 6' long	6	500 to 1040	Bituminous	Underfeed, ram	Variable feed rate; Automatic pressure or water temperature regulator.	Rectangular retort; Ashes removed as clinkers; Overload shear pin.
	Type R 6' wide x 5' long through 7' wide x 7' long	8	900 to 1960	Bituminous	Underfeed, ram	Variable feed rate; Automatic pressure or water temperature regulator.	Rectangular retort; Ashes removed as clinkers; Overload shear pin.
5	Nos. 1, 2	2	3½-45	Anthracite, rice and buckwheat	Underfeed, screw	Room thermostatic control; Twelve speed manually-shifted transmission.	Round retort, ash falls from edge into pit; Thermal overload relay. Hopper and mechanism combined in bullet-shaped cabinet; Ratchet transmission.
6		12	30 to 1200	Bituminous	Underfeed, screw	Dual automatic controls, comprising thermostat and limit switch; Room thermostat; Air intake, and hold-fire controls; Warm-air, hot water, steam or vapor pressure.	Round retorts on stokers up to 80 lb. per hr., over this, rectangular retorts; Ash removed as clinkers; Overload shear pin; Covered hopper; V-belt driven, gear transmission.
		1	Small domestic	Bituminous screenings	Underfeed, screw	Controls as necessary; Motor overload switch.	Round retort; Designed to fuse ash; V-belt driven gear transmission; Hopper and mechanism combined in cabinet. Hopper is covered.
7		14	25 to 1200	Bituminous	Underfeed, screw	Variable feed rate; Air shutter on blower; Operating and limit controls available.	Special design of tuyeres available for different coal conditions. Ash removed as clinkers. Overload shear pin. Small models have covered hoppers. Gear transmission.
8	Types E (Classes M&H)	3	150 to 600 boiler hp.	Bituminous	Underfeed; ram driven by steam piston or gear drive from steam or electric motor	Control system provides continuous adjustment of fuel feed and air supply over wide range of load; Automatic regulation extra; Automatic "on-and-off" control standard; Eight feed speeds.	Rectangular retort. Active grate surface composed of alternate moving and stationary bars. Shaking dump grates to replace dead plates extra. Auxiliary pusher blocks mounted on sliding plate.

REFERENCE LIST—HEATING STOKERS

M'FR. NO.	MODEL NUMBERS	NO. OF SIZES	RANGE, MAX. CAP'Y (LB. PER HR.)	TYPE OF FUEL BURNED	TYPE OF STOKER	CONTROLS AVAILABLE	REMARKS
8 Cont'd	Type K		Up to 200 boiler hp.	Bituminous	Same as Type E	Same as Type E	Same as Type E
	C-E Design S	4	To 250 boiler hp.	Bituminous	Underfeed, screw conveyor and reciprocating pusher	Variable speed transmission; Automatic control if desired.	Rectangular retort. Shaking dump grates. Moving tuyeres to agitate coal.
9	Heavy Duty Model No. 10, 15, 25, 35, 50, 60, 90, 120.	8	100 to 1200	Bituminous	Underfeed, screw	Variable speed transmission; Adjustable damper on fan.	Rectangular retort; Gas back eliminator; Feed screw operates intermittently, causing alternate compacting and releasing of fuel mass, allowing air to penetrate; Safety clutch automatically disengages in case of obstruction.
	Models 25, 50.	2	25 and 50	Bituminous	Underfeed, screw	Two feed rates, for mild and severe weather; Belt shifted on pulleys; Room thermostat; limit switch, and hold-fire control; Regulator in air duct.	Rectangular retort; Automatic safety clutch; Hopper is designed to be smoke and gas consuming; Gear transmission.
	Models 10/20 20/30 30/40	3	20; 30; 40	Anthracite, rice or buckwheat	Underfeed, screw	One feed for rice, two for buckwheat; Room thermostat; limit switch, and hold-fire control; Regulator in air duct.	Round retort; Ashes conveyed to receptacle beside hopper; Hopper designed to be smoke- and gas-consuming; Gear transmission.
	Model 7½	1	52 and 75	Bituminous	Underfeed, screw	Light load feed and heavy load feed; Air control on fan inlet.	Rectangular retort; Gas back eliminator; Automatic safety clutch.
10		26	3,100 sq. ft. to 27,000 sq. ft. E.D.R.	Bituminous or mixture of bituminous and anthracite	Underfeed, plunger	Variable length of stroke; Variable speed motor and control extra; controlled by either hot water temperature, steam pressure or by air thermostat.	Large sectional retort; Auxiliary pusher blocks; Overload and low-voltage protection for motor; Driven by steam turbine or electric motor
		35	100 hp. to 300 hp.	Bituminous	Underfeed, plunger	Same as above.	Same as above.
11		9	120 to 1350	Bituminous	Underfeed, screw	Air volume regulator on fan; Room thermostat; Steam pressure or hot water controls as required; Hold-fire; Combined low water and pressure control; Motor overload switch.	Rectangular retorts. Ashes removed as clinkers. Overload shear pin. Gear transmission.
12	WR-0, WR-1, WR-2, WR-3.	4	1 to 7	Anthracite, No. 1 buckwheat, No. 2 buckwheat	Underfeed, screw	Thermostat (step control; On and off type; Modulated). Remote manual and hold-fire controls; Water temperature and steam pressure controls available.	Round retorts. On WR models, ash drops into receptacles under boiler. All other models have automatic ash removal systems. Safety shear pin. Ratchet drive.
	JR 16-A 20A-20B H2R M K K-19	1 1 2 1 1 1 1	12½ 26 40-50 22 29 42 55				
13		10	20-1400	Bituminous	Underfeed, screw	Automatic air volume control.	Small models have round retorts; large have rectangular retorts; Ashes removed as clinkers; Has overload relay and shear pin; Ratchet drive; Small sizes have covered hoppers.
14	Series 545 Series 650 Series 665 and Series 1265		50 to 250 hp. 100 to 300 hp. 150 to 600 hp.	Bituminous	Underfeed hydraulic ram	Feed control regulates frequency of strokes; Ram makes full stroke at full speed, at all feeding rates.	Rectangular retort; Side dump grates; Hydraulic pressure developed by motor-driven oil pump; Direct-driven forced-draft blower; Auxiliary pusher blocks on rod attached to ram.

REFERENCE LIST—HEATING STOKERS

M'FR. NO.	MODEL NUMBERS	NO. OF SIZES	RANGE, MAX. CAP'Y (LB. PER HR.)	TYPE OF FUEL BURNED	TYPE OF STOKER	CONTROLS AVAILABLE	REMARKS
15	DA		10-40	Bituminous	Underfeed, screw	Four coal feed rates; Damper in air duct; Automatic controls standard.	Round retort; Ashes removed as clinkers; In Model DAA ashes drop into ash pit; Safety overload shear-pin and overload cut-out switch; Covered hopper.
	DB		20-80	Bituminous			
	DAA		10-40	Anthracite			
16	H3; H6; 1; 2; 3; 4; 6; 8; 12.	9	30-1200	Bituminous Mid-west screenings	Underfeed, screw	Domestic size (H3 and H6); Room thermostat; Water temperature or steam pressure control; stack switch; clock thermostat. Commercial sizes—steam pressure or water temperature control.	Rectangular retorts with sectional tuyeres. Safety shear pin and thermal overload cut-out. Ashes removed as clinkers. Ratchet transmission. Covered hoppers on small models.
17		10	120-1250	Bituminous, nut and slack	Underfeed, screw	Adjustable damper for air control; Three coal feed rates; Boiler and room temperature controls as desired.	Rectangular retort; Hopper furnished open or closed; Shear pin to prevent overload; Gear transmission.
	Domestic	3	20-60	Anthracite, buckwheat or rice	Underfeed, screw	Room thermostat; Boiler limit controls as required; Hold-fire control.	Round retort; Ash removal by gravity, falls into cans in pit beneath the furnace; Ratchet drive.
18	Domestic	1	Domestic size	Bituminous	Underfeed, screw	Three speed transmission; Damper on fan inlet; Automatic temperature and limit control.	Round retort; Covered hopper; Designed to fuse the ash to clinkers; Safety shear pin.
	Series C	4	30 to 100	Bituminous	Underfeed, screw	Same as above.	Rectangular retort.
	Series H	7	150 to 1000	Bituminous	Underfeed, screw	Same as above.	Rectangular retort; Dead plates.
19	10 20 35 50 75	5	100 to 750	Bituminous	Underfeed, screw	Automatic control of feed and operation; Feed rate regulated by controlled intermittent operation; Separate fan motor.	Rectangular retort; Ashes removed as clinkers; Hopper gas eliminator; Safety overload cut-out relay.
	No. 3F No. 5F No. 7F	3	30-100			Room thermostat; Limit and hold-fire control.	
20	Domestic Series De Luxe 40, Junior 60, Junior 90, R30, R40, AAA20, AAA35, AAA50, RA18, RA35, RA50.	11		Models for both bituminous and anthracite	Underfeed, screw	Three speed transmission; Iris air regulator; Room thermostat; clock thermostat; Hot water, pressure, hold-fire time and furnace temperature regulators.	Round retort; Ashes removed as clinkers in bituminous models; Automatic ash removal to cans in anthracite models; Covered, dust-proof hoppers; Hoppers round or rectangular; V-belt drives gear transmission; Overload shear pin. Models with direct coal feed from bin or bunkers available.
	Commercial Series No. 2, 3, 4, 4A, 5, 5A.	6		Models for both bituminous and anthracite	Underfeed, screw	Same as above.	Rectangular retort; Rectangular hoppers; Ashes removed as clinkers. V-belt drives gear transmission. Overload shear pin; Models with direct coal feed from bin or bunkers available.
21		7	60 to 1250	Bituminous	Underfeed, screw	Clock thermostat; Low water cut-out and pressure control; Air volume damper; Combination pressure and vacuum control. Others available.	Rectangular retort. Designed to fuse ash to clinkers. Ratchet type transmission. Safety shear pin.
	Domestic model	1		Bituminous	Underfeed, screw	Hold-fire control; Thermostat; Clock-type thermostat. Others available.	Round retort. Designed to fuse ash to clinkers. Covered hopper. Safety shear pin.
22	Type "U"	7	100 to 1000	Bituminous	Underfeed, screw	Control discharge for fan; Automatic pressure regulating switch.	Rectangular retort. Side grates have natural draft, sift ashes and dumped by rocking lever. Safety coupling. Gear transmission. Manufacturer also makes chain grate and overfeed stokers.

REFERENCE LIST—HEATING STOKERS

M'FR. NO.	MODEL NUMBERS	NO. OF SIZES	RANGE, MAX. CAP'Y (LB. PER HR.)	TYPE OF FUEL BURNED	TYPE OF STOKER	CONTROLS AVAILABLE	REMARKS
23	Nos. 3-C, 4-C, 6-C, 9-C, 12-C	5	30-125	Bituminous screenings or stoker coals	Underfeed, screw	High limit; Hold-fire and relay.	Rectangular retort; Fan and blower integral part of stoker unit.
	Nos. 17, 20, 24 Jr.	3	125-275	Bituminous screenings or stoker coals	Underfeed, screw	High limit.	Long narrow retort; Separate fan and motor.
	Nos. 24, 30, 36, 48, 54.	5	350-1200	Bituminous screenings or stoker coals	Underfeed, screw	High limit.	Long narrow retort; Separate fan and motor.
24	Series 2AF	7	20 to 100	Anthracite	Underfeed, screw	Automatic control - thermostat, upper and lower limit control. Controls operate stoker intermittently.	Round retort; Screw conveyor carries coal directly from bin and another deposits ashes automatically in covered receptacles; Overload safety clutch.
	Series 2AH	7	20 to 100	Anthracite	Underfeed, screw	Same as above.	Same as above, but does not convey coal automatically from bin. Covered hopper.
	Series 3AF	7	20 to 100	Anthracite	Underfeed, screw	Same as above.	Same as Series 2AF, but does not have automatic ash removal.
	Model 15AF	7	20 to 100	Anthracite	Underfeed, screw	Same as above.	Similar to Series 2AF, but bin conveyor screw is in fixed position in straight line with stoker. No automatic ash removal.
	Series 3BH	5	25 to 200	Bituminous	Underfeed, screw	Same as above.	Small sizes have round retorts; large sizes are rectangular. Covered hopper. Designed to fuse the ash to clinkers.
	Series 3AH	7	20 to 100	Anthracite	Underfeed, screw	Same as above.	Same as 2AH, but does not have automatic ash removal.
25	34-50 34-50A 34-50B 34-75 34-100 34-100A 34-150 34-250 34-350	9	50-350	Anthracite and bituminous	Underfeed, screw	Thermostat; Pilot fire and hot water control; Steam controls ranging from 3" vacuum to 350; Warm air control; Other controls can be furnished to operate bottle washing plants, bakery ovens, lumber drying kilns, type metal melting pots and printing offices.	Round or rectangular retorts with interlocking air-cooled dead plates; Safety shear pin; Ashes removed in form of clinkers; Thermal overload protectors on all sizes.
26		5	720 to 1100	Bituminous	Underfeed, hydraulic ram	Automatically started and stopped by pressure control; Feed rate adjustable; Safety relief valve.	Rectangular retort. Hydraulic pressure obtained from motor-driven oil pump. Fan, motor and oil pump mounted separately. Auxiliary pusher rod attached to ram. Ashes removed as clinkers.
		4	120 to 480	Bituminous	Underfeed, hydraulic ram	Same as above.	Same as above.
27		19	20 to 1200	Bituminous	Underfeed, screw	Variable feed rate; Air volume regulation on fan inlet; Dial control operating on fuel bed air resistance.	Small sizes have round retorts. Large sizes have rectangular retorts. Ratchet drive and continuous models available with straight-in-line, or right or left offset hoppers. Overload circuit-breaker. Ashes removed as clinkers.
28	Models A, B, C	5	25-90	Bituminous	Underfeed, screw	Adjustable coal feed, air volume, grate shaker, and ash remover. Thermostat, stack temperature control, and limit control standard.	Round retort with surrounding automatically agitated grates; Screw type ash remover; gas back eliminator; Safety cut-off switch.
29			60 to 6000	Bituminous	Underfeed, ram, either steam, mechanical or hydraulic drive	Variable coal feed; Automatically controlled by steam pressure.	Rectangular retort. "Reflex" drive-plunger operates with quick thrust, regardless of feed rate. Side dumping grates. Auxiliary pusher blocks. Also available with motor-driven hydraulic drive.

REFERENCE LIST—HEATING STOKERS

M'FR. NO.	MODEL NUMBERS	NO. OF SIZES	RANGE MAX. CAP'Y (LB. PER HR.)	TYPE OF FUEL BURNED	TYPE OF STOKER	CONTROLS AVAILABLE	REMARKS
30	No. 2 No. 3 No. 5 No. 7 No. 10 No. 15 No. 20 No. 30 No. 40	9	20-400	Bituminous	Underfeed, screw	Intermittently operated by thermostat or pressure control to meet heating demand. Hold-fire device: "Stokostat" (hydraulically operated).	Retort: Sectional (All Models); Ash removal: Clinker (through fire door); Overload protection: Hydraulic pressure release (all models); Overload-relay in motor starter on 150, 200, 300 and 400 lb. models. Covered hopper.
31	13, 23, 33, 43, 53, 73, 103, 153, 203	9	60 to 1240	Bituminous	Underfeed, screw	Variable feed rate; Automatic control; Starting relay.	Rectangular retort; Belt-driven transmission; Air-cooled tuyere blocks and dead plates; gas back eliminator; Designed to fuse the ash to clinkers.
32	Model D4	1	0-70	Bituminous	Underfeed, screw	Room thermostat; Relay transformer; Limit controls or direct boiler controls.	Round retorts; Safety shear pin; Ashes fused and removed with tongs; Covered hopper.
	Model B4	1	0-110				
33		7	90 to 1200	Bituminous	Underfeed, hydraulic ram	Coal feed controlled over entire range from dead stop to full load. Damper on fan.	Rectangular retort. Hydraulic pressure generated by motor-driven oil pump. Auxiliary pusher blocks on ram. Covered hopper ash removed as clinkers.
34	Underfeed	6	75-500	Bituminous	Underfeed, screw	Five speed transmission; Either pressure or temperature control; Air control damper; Banking switch.	Rectangular retort; Ashes removed as clinkers. Dead plates mounted on burner by interlocking joints; Gear transmission.
	Domestic Model		25-75	Bituminous	Underfeed, screw	Automatic control by thermostat; Limit control unit included; Banking switch; 5-speed transmission.	Completely enclosed; Hopper gas eliminator; Low type hopper; Gear transmission.
35	0, 1, 1A, 2, 3, 4, 5	7	40 to 250	Bituminous	Underfeed, screw	Variable feed rate: Thermostatic control; hold-fire and limit switch; Automatic air control.	Either round or rectangular retorts; Overoad relay; Clutch release; Ashes removed as clinkers.
36	Domestic 1100-A 1100-B 1100-C	3	25 50 75	Bituminous	Underfeed, screw	Plain thermostat; Transformer relay; Protective starting switch; Maintained fire control; High limit control.	Models 1100-A and 1100-B have round retorts. Model 1100-C has a rectangular retort. All with built-in air box. All 1100 models have covered hoppers. All other models have rectangular retorts. Overload shear pins on all models. Gear transmission. Ashes removed as clinkers.
	2200-A 2200-B 2200-C	3	100 150 200	Bituminous	Underfeed, screw	Magnetic switch; High limit control.	
	3300-A 3300-B 3300-C	3	300 350 400				
	4400-A 4400-B 4400-C	3	500 625 750				
37		2	700 sq. ft. steam 1100 sq. ft. steam	Anthracite, Buckwheat or Rice	Underfeed, plunger	Room thermostat; Pressure and temperature limit control; Hold-fire and out fire control.	Round retort; Ashes removed to covered cans by plunger and bucket elevator; Covered hopper; Gear transmission.

Stoker Reference Lists, similar to those on pages 18 to 22, except that company names of manufacturers are included, instead of designating makers by numbers, are available to subscribers by addressing the Editor, HEATING AND VENTILATING, 148 Lafayette Street, New York.

stoker as usual equipment or which are mentioned in the catalogs in connection with the description. In many cases there is no key to what the usual practice really is, as inquiries did not bring this point out clearly. The words "Controls Available" at the top of the column should therefore not be taken too literally for, in a sense, almost any control on the market is "available" for use on a stoker. There is also some confusion because of the lack of uniformity in the names applied to the controls. So far as possible, the listing attempts to make clear the *means* of control used.

Operating and safety control for stokers has been no simple problem and much ingenuity has been spent on it. This is true in spite of the fact that there was previous experience in controlling oil-burners. The hold-fire control which provides a means of preventing the coal fire from going out in mild weather is a case in point. Discussion of the methods of control and a description of the control devices applied to stokers is not possible in the limited space. It is believed though that enough is given in the column to permit a fair idea of the control methods and equipment.

Uses for the Tables

Since the tables cover a sizable proportion of the stokers now available and include those offered by most of the large producers they are useful in gathering certain facts and figures if properly handled. In this connection it is important to be clear as to what stokers are included and how nearly complete the listing is.

Of the total companies making burners of the general type listed, it is estimated that approximately twenty offer equipment intended for use with anthracite while the products of the others are for use with bituminous. The tables list eleven manufacturers as offering anthracite burners and six of these have models for handling either anthracite or bituminous, leaving five who specialize in anthracite burners only and twenty-six who have bituminous burners only. Keeping in mind that there are probably not less than 100 manufacturers in the field it will be seen that the lists are more nearly complete as regards the anthracite burners than in including those for bituminous. In other words, many of the makers not listed offer bituminous burners only.

As an example of how the tables can be used in collecting facts and figures the following are presented. The 37 manufacturers whose models are listed offer a total of 69 models which are available in 442 sizes. Twenty-nine of the thirty-seven manufacturers make a model, or a size, suitable for use in even the smallest installations, while the other nine evidently do not go after the very small jobs. Of the twenty-nine who make a small size, only six make nothing but small sizes. In other words there are six makers listed who go in for small jobs only, and all except one of them build stokers for burning anthracite. Five makers build nothing but anthracite burning stokers while six others state that their apparatus will handle both anthracite and bituminous. Two makers of anthracite burners build them to medium sizes such as would handle what are commonly called commercial jobs. The maximum fuel rate for the largest anthracite burner on the list is 100 lb. per hr., or from 2000 to 3000 sq. ft. of steam.

Another use of the tables is in forming an idea of what features are commonly embodied in stokers for specialized applications. As an example suppose we follow through the list and isolate out the small sizes. A good picture of these models results. It will be noted

(Continued on page 74)

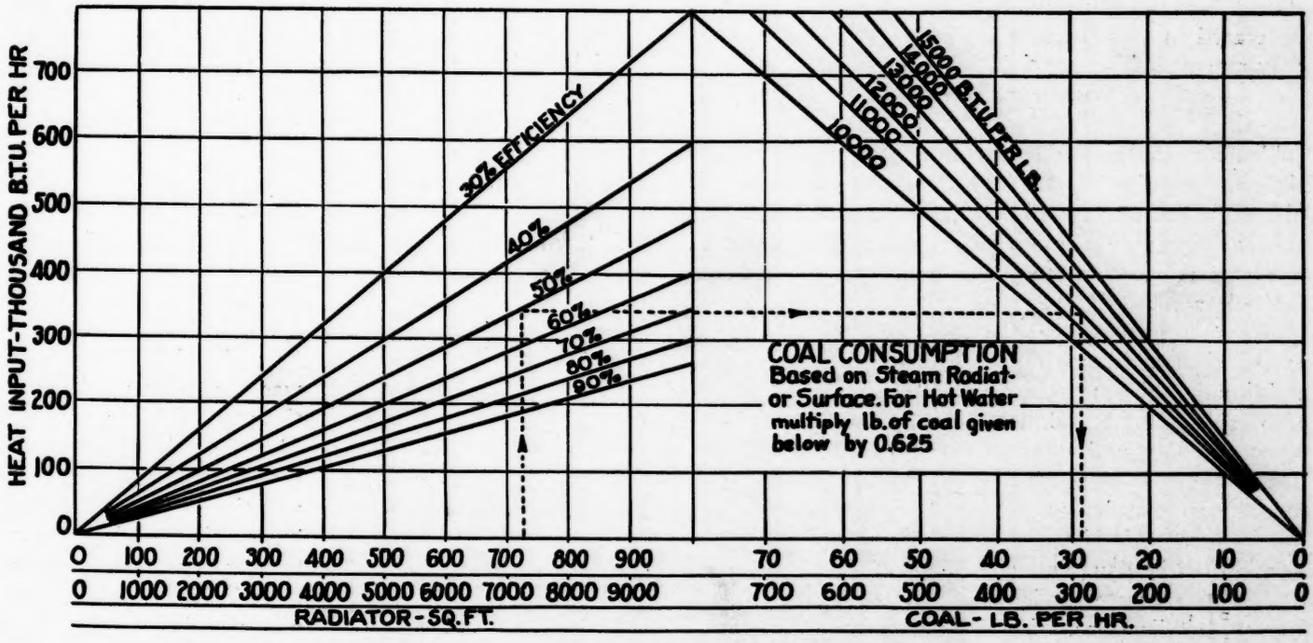


CHART FOR DETERMINING COAL CONSUMPTION FROM AMOUNT OF RADIATOR SURFACE

Assume system with 725 sq. ft. of radiator surface, 50% efficiency, using 12,000 B.t.u. coal. Follow vertical line from 725 sq. ft. point to 50% efficiency line. Project horizontal line to 12,000 B.t.u. line and drop to coal consumption scale. The result is 29 lb. per hr. for a steam system. For hot water multiply the result by 0.625, or 18.1 lb.

Convector Heaters with One-Pipe Steam Systems

By M. WILLIAM EHRLICH†

IN connection with the effort of producing a convector-air-vent combination to work on a straight one-pipe steam system, many tests were made on commercially available air valves and convection heaters. The results showed that with one type of heater tested any style of valve—pet cock, carbon post vent, or later and more costly models — would give acceptable results. As both the heater and the test method are new, they are described at some length.

The heater used resulted from a series of investigations. It is based on the premise that a solution to problems arising when convectors are used on one-pipe systems could be found if counterflow of steam and water within the heater were eliminated. This convector employs one way or uniflow circulation in a series-parallel circuit and compensates for pressure loss. When operation starts, the air valve breathes with the action of the flow, until all air has been expelled. The way the heater functions is shown by the record of one test, as here presented. The performance is for the heating element only, without cabinet enclosure, as in the illustration. With a cabinet, the heater would have provided a greater output and would have given better heat distribution in the room. However, the capacity of the heating element alone, as installed for test, is about the same as would normally be placed in this room to care for the usual heating requirements. The room is fully furnished, but occupied only by the observer during the period of the record.

The location of the heater is on an inside wall, as shown in Fig. 1. A mercury thermometer is placed in the middle of the room, at about the 5-ft. level to indicate the room temperature. The letter, F, indicates another mercury thermometer, shielded and located several inches above the floor level; T is the thermostat with a red-liquid thermometer, also shielded. At C is shown a compound steam gauge which is connected directly to the boiler in the basement. While this location of the gauge may not give accurate boiler pressure indications, the readings would certainly be relative as compared with the boiler behavior. These are the pressure readings as plotted in the curve sheet.

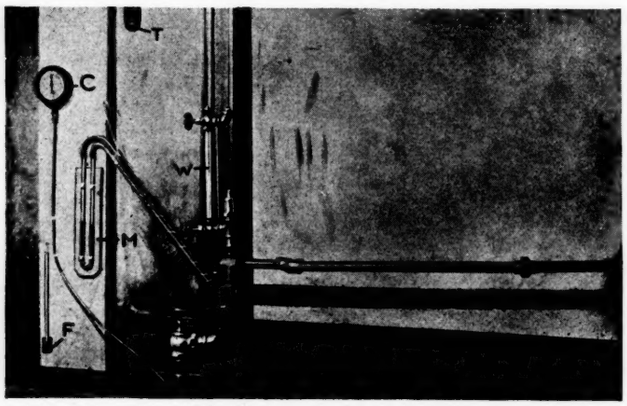


Fig. 1. Convector heater set up for test

In the test the heater was connected to a system that is oil-fired, and which gives both thermostatic and pressure control, automatically. The thermostat shuts off the oil burner when the temperature setting of 73° has been reached; while the diaphragm shuts off the burner when the pressure limit of 1¼ lb. has been reached. There is some overlap in this duplex control. Once steam has been generated, the pressure setting is quickly attained and the burner is shut off or idles for a minute or so, until the lower pressure limit is reached or the thermostat operation causes a pick-up in the steam generation. This is clearly indicated by the variations of pressure and vacuum recorded for the test period. In general, it means that the heater condensed its steam and was again vented, thus the air valve had to function for each cycle of the burner operation due to the fluctuations of the steam pressure and the vacuum conditions. In other words, the air valve was called into service at least nine times during the test period.

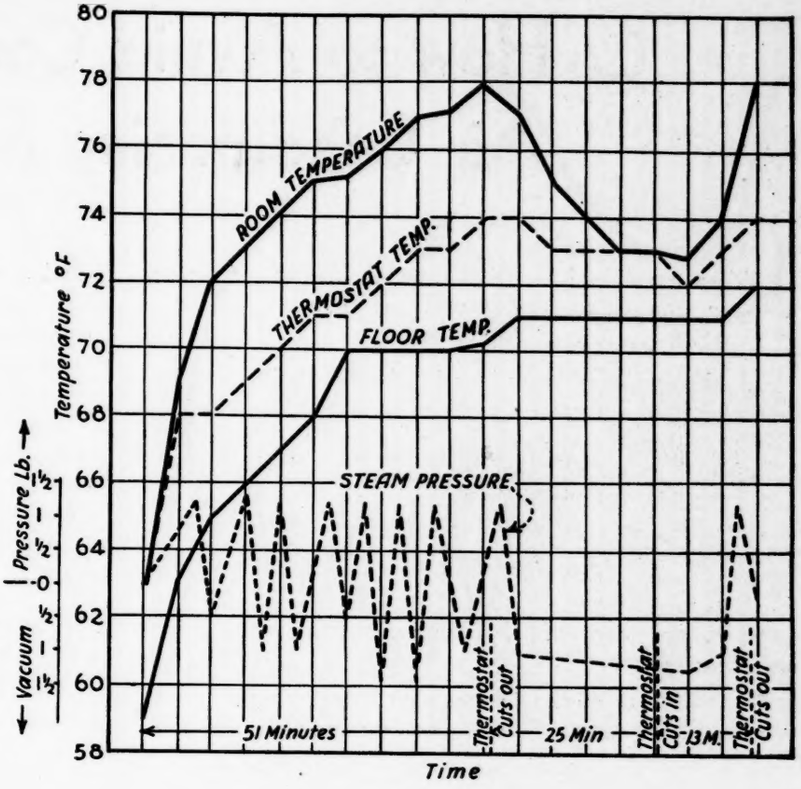
The floor and room thermometers are similar instruments, except that one has a shield. The thermometer on the thermostat is the commercial type that comes with the device, but was shielded. The shields consisted of pieces of metal around the bulbs, with the bright side exposed to the room. This description is given so that behavior of the different thermometers may be made clear in relation to the temperature readings recorded, which were taken at 5-min. intervals in the different locations indicated.

At the start of the test the floor temperature was 59° while the room temperature and the thermostat reading were both at 63°. As steam was supplied, all three temperatures increased. At the end of the first 5 min., the heater was steam-hot all the way through. After a run of 51 min. the thermostat requirement had been met and the boiler shut down, automatically. The floor temperature was then over 70°; the room temperature just under 78°, while the thermostat reading gave 74°. See Fig. 2.

During the idle period of 25 min. the floor tem-

†Chief Engineer, Commodore Heaters Corporation.

Fig. 2. Record of test showing the pressure and vacuum at the convector, floor temperature, thermostat temperature, and room temperature, plotted against time.



perature had crept up to 71° and the room temperature fell to the 73° level of the thermostat when the device clicked and the boiler was again cut into service. With the room thus in good thermal state, it took but 13 min. of burner operation to make steam and again fulfill the heating requirements as indicated on the chart.

Tests other than for the items recorded, included pressure differential readings as shown by a U-tube manometer M, and the observance of water action at or above the air valve, as would be indicated if it reached into the water glass W. During the test described no water appeared in the glass at any time.

Underwriters Make Recommendations for Low Water Feeders

AFTER an exhaustive investigation of emergency low water feeders for cast-iron and steel heating boilers, the Engineers Conference of the Boiler and Machinery Department of the National Bureau of Casualty and Surety Underwriters has prepared standard requirements for the construction of such emergency low water feeders which it recommends to manufacturers and users of such equipment.

This, it is announced, is in no sense a definite ruling but represents recommendations based upon the results of years of broad experience and the investigation of the cause of a large number of failures and accidents. The recommendations are as follows:

1. Water inlet valve to be separate from the float chamber and sufficiently isolated or insulated from the heat to insure a temperature at which scale will not be deposited.
2. Float to be of rugged construction and to have a displacement equivalent to a sphere 5 in. in diameter.
3. Bearings, pins, water valves and their seats and other moving parts to be of non-corrosive material.
4. All parts to be readily accessible for inspection, cleaning and repair.
5. To be provided with a blow-off connection to the float chamber to facilitate the removal of deposit in the float chamber, and to permit testing the device without lowering the water level in the boiler. Such blow-off connection should be either an independent connection to the float chamber or a connection in the water line to the feeder immediately below the float chamber.
6. Device to be set to function when the water level in the boiler is 1 in. above the bottom of the gauge glass, assuming that the gauge glass is set at the proper level and to be of sufficient capacity to maintain that water level when the return valve or valves are closed and the boiler is operated under the most forced conditions of firing.
7. The device to be so connected that it will feed through the regular feed connection and not the water column.

The recommendations, as explained by J. P. H. de Windt, manager of the Boiler and Machinery Department, relate to those emergency low water feeders installed on boilers which are used for the heating of residences, apartment houses, offices, and similar buildings. Such boilers are of the type where it is desired to feed the water to the boilers automatically, and to eliminate the possibility of lime or sediment deposit in the water feeder which render the same inoperative and thus cause the cracking of sections or destruction of boilers. It is also recommended that cast-iron or steel heating boilers fired by oil burners or stokers be equipped with low water cutouts in addition to the low water feeders.

How to Avoid Corrosion of Air Conditioning Equipment

IT is a recognized fact that the corrosion of air conditioning equipment depends upon the following factors:

1. Fresh water composition.

2. Absorption of impurities by the circulating water and the resultant catalytic effect of iron sulphate and copper sulphate on oxidation of sulphur dioxide to trioxide. The main impurities are carbon dioxide, sulphur dioxide, and sulphur trioxide, all of which are acidic in nature and cause low pH values in water.

3. Practically complete saturation of the water with air.

4. Impingement of the high velocity spray on the metal surface.

5. Dissimilar metals in contact.

In the main, corrosion in air conditioning equipment may be attributed to the presence of the smoke problem, to the products of combustion.

I have always considered it a serious mistake by manufacturers of air conditioning equipment not to point out to their customers the wisdom of having the water analysed periodically, and of conditioning the water wherever it is found necessary.

Unfortunately, however, an examination of the fresh water supply is, by itself, no criterion whether or not corrosion may be expected in air conditioning equipment, unless the water itself is very corrosive, which is generally not the case. All manufacturers of air conditioning equipment point out to their prospective customers the fact that air conditioning provides a cleaner, purer, more sanitary air supply. A logical question to ask is, "What happens to the Impurities?" Also, "What impurities are present, and to what extent are they removed?"

The answer to the first question is self-evident. There is only one place where the impurities can go, the water which is being used to wash the circulated air. In general, the main impurities which are being removed by the equipment are acidic in character and are mainly carbon dioxide, sulphur dioxide, and to a lesser extent sulphur trioxide. These are usually the most important impurities from a corrosion viewpoint although there are instances where hydrogen sulphide is the main factor.

Obviously then, in addition to the analysis of the fresh water supply, there must also be periodical examinations of the water circulated in the system. These examinations should cover daily samples up to and including the time when the water is discharged, which in most cases is recommended after one week's use. Chemical analysis of these samples should include pH, silica and alumina, lime, magnesia and zinc in some cases, if not in all. The latter determination should be included in all cases where the equipment is galvanized. In cases where copper equipment is used, the determination should include this metal. The ions determined should include chlorides, sulphates, carbonates, bicarbonates; in other words, the examination should be complete.

It has been found by laboratory tests followed by actual observations in the field, that the pH value in galvanized iron equipment should be about 8.5 to 9.0. This alkalinity should be maintained by the continuous addition of the proper chemicals which cause a protective coating to build up on the metal.

It should be emphasized that the pH value is only an indication. It does not follow that no corrosion will take place if the circulating water be maintained at a pH value of 8.5. If the chemical added to the water is not film-building in character the corrosion may be increased. Use of sodium hydroxide alone in air conditioning equipment is not permissible. The treatment must involve some material which will form a protective coating on the metal surface, or will passivate the metal. Proper conditioning of the water will include the use of materials such as sodium hydroxide, sodium silicate, sodium phosphate, or sodium dichromate, in various combinations.

It has been demonstrated in the field that the proper chemicals in the spray water not only reduce the corrosion but also the quantity of sulphur dioxide and carbon dioxide to a point where careful chemical analysis is required in their determination. Where this removal is effected, the pH value is within the range offering the maximum protection.

Inspection of the protective coating on the dehumidifier, eliminator plates, and baffle plates should be made at least twice a year or oftener, and the metal surface should be kept covered. Or perhaps it would be better, assuming the water examinations are being made, that the inspection of equipment depend upon the findings from the water examinations.

The question of dissimiliar metals in contact is one of serious import. Generally, it is overcome by insulating or isolating the different materials. Use of rubber, asbestos, and, more recently, pressed paper and wood has helped overcome this difficulty. Most air conditioning engineers keep the number of different metals in the equipment at a minimum figure. Use of plastics in several test installations is being watched with much interest.

It should be emphasized in conclusion, that owners of air conditioning equipment should protect their investment by periodically checking up on the water that is being sprayed in their equipment.—*From an article by W. H. Carter in the March,* 1934, *"Chemical and Metallurgical Engineering."*

Heating and Ventilating

MODERNIZING

A monthly section for promoting the interests of engineers and contractors in the modernizing and renovizing of heating, ventilating, and air conditioning plants in buildings.

PROPERTY INVENTORY SHOWS MARKET FOR MODERNIZING IN 62 CITIES 28

Returns of 17 additional cities of the survey by the Real Property Inventory. Figures to date show type of heating and fuels used in 62 cities.

BANKS SPONSOR MODERNIZING IN PORTLAND AND BOSTON 28

How banks in Portland, Ore., and Boston are helping local building recovery by backing modernizing.

NEWS FLASHES FROM WASHINGTON 29

Organization of Federal Housing Administration under way; PWA makes its position on housing clear; Home Owners Loan Corporation gets many requests for modernizing loans; price reductions to aid modernizing are proposed.

GRILL MODERNIZED WITH $7500 COOLING PLANT 30

An excellent example of the difficulties met with in modernizing a high-class restaurant with air conditioning. Details and illustrations of installation.

EXCLUSIVE HABERDASHER MODERNIZES WITH UNIT COOLERS 32

Unit coolers used to save valuable space in air conditioning a haberdashery. Simplicity is feature of installation.

WHAT WILL I USE FOR MONEY? Part 4—GOVERNMENT FINANCE FOR MODERNIZING 34

Latest information on two government plans of lending for modernizing. Complete details on loans through government agencies.

CHANGES IN BOILERS, ADDITION OF UNIT HEATERS, PAY DIVIDENDS TO INDUSTRIAL PLANT 35

Remodeling of industrial plant's heating system expected to save 100,000 gal. of fuel oil annually. Use of fan-type unit heaters, changes in boilers, and zone control system expected to effect reduction.

Property Inventory Shows Market for Modernizing in 62 Cities

THE Real Property Inventory being conducted by the U. S. Department of Commerce under the direction of Daniel E. Casey is about completed. The Inventory covers 63 cities, and at least so far as the heating and fuel is concerned, figures are now available for 62. Cleveland data are not yet compiled.

Preceding issues of HEATING AND VENTILATING give the data for both the type of heating plant and the type of fuel for 42 cities.*

The accompanying table gives the percent distribution of the various types of heating plants and fuels in each city. The totals of the percent for each city do not in all cases add up to 100%. In such cases the difference between the obtained total and 100% are those "not reported."

For the 62 cities covered, warm air was the most popular in Lansing and Syracuse, and least popular in Shreveport and Baton Rouge. Steam or vapor was most popular in Portland, Me., and Frederick, Md. Hot water accounts for nearly one-third of the installations in St. Paul and Minneapolis, while stove heating was used almost entirely in Shreveport and Little Rock.

Coal was almost the only fuel used in Asheville and Paducah. Nearly 73% of the homes in Portland, Ore., burn wood, and Jacksonville also uses this fuel to a

(Continued on page 73)

TYPE OF HEATING PLANT

City	Warm Air	Steam or Vapor	Hot Water	Stove	Other	None
Worcester, Mass.	10.1%	36.9%	1.8%	50.6%	0.3%	0.1%
Waterbury, Conn.	14.7	7.7	19.9	57.3	0.2	0.1
Providence, R. I.	9.7	37.7	0.7	50.9	0.6	0.2
Binghamton, N. Y.	58.8	16 0	2.7	22.2	0.2	0.0
Syracuse, N. Y.	71 2	9.9	2.7	15.9	0.2	0.1
Trenton, N. J.	37.1	16.3	22.6	23.3	0.4	0.2
Erie, Pa.	57.4	4.3	3.8	33.4	0.8	0.3
Indianapolis, Ind.	47.6	11.7	2.1	38 0	0.4	0.2
Peoria, Ill.	61.0	4.7	6.9	27.0	0.3	0.0
Minneapolis, Minn.	31 4	13.7	31.5	22.5	0 5	0.4
St. Paul, Minn.	28.9	9.3	35.5	25.8	0.3	0.1
Des Moines, Ia.	61.1	9.7	4.7	24.2	0 2	0.1
Wichita, Kan.	33.2	6.7	2.1	57.6	0.2	0.1
Wilmington, Del.	30.2	4.5	28.4	34.9	1.6	0.2
Wheeling, W. Va.	32 0	1.8	0.8	50.1	14.5	0.5
Atlanta, Ga.	16.0	12 3	0.5	35.8	35.2	0.1
Jacksonville, Fla.	1.4	3.3	1.1	61.4	32.0	0.7
Birmingham, Ala.	9.9	5.9	1.6	21.8	60.7	0.1
Salt Lake City, Utah	30.0	12.4	4 4	51.9	0.6	0.6
Seattle, Wash.	37.0	11.2	12 4	37.9	1.2	0.2
Portland, Ore.	51.0	11.2	2.2	34.1	1.3	0.2

*For 25 cities see page 44, HEATING AND VENTILATING, June, 1934. 17 additional cities were covered on page 32 of the July, 1934, number.

Banks Sponsor Modernizing in Portland and Boston

MODERNIZING campaigns of many different kinds are being carried on throughout the country. Though they differ in the sponsoring organizations, in their method of selling the idea to the public and in a number of other ways, most of them have as their aim an increase in the modernization of homes. Two examples of quite different types of such campaigns are in Portland, Oregon, and Boston.

In Portland the First National Bank, which has been making an intensive study of the lumber industry which provides 50 cents of every trade dollar entering Portland, launched the "Renovising Portland Campaign." A worn-out shack built in 1880 was donated to the campaign and dragged through the streets to the post office lawn. The aid of the Oregon Chapter of the A.I.A. was secured to plan the renovising while Portland building supply dealers donated materials. For eight weeks everything that could be done to improve the structure was done.

The bank backing the campaign then started an intensive advertising campaign by mail and through the newspapers. The house was kept open for weeks, during which time 157,654 people visited it.

Results are:

1—Building and remodelling permits have shown a steady increase.

2—Home owners are making more applications for modernizing loans.

3—Nearly every firm which cooperated in the campaign has reported some new business directly traceable to it.

A quite different plan is being tried out in Boston under what is known as the "Boston Home Modernizing Plan." Combined to increase modernizing are the Massachussetts Co-operative Bank League and its membership, the Boston Society of Architects, the *Boston Post,* and building material dealers and manufacturers.

The bank league announced some time ago that it had $20 million immediately available through its member banks for repairing and modernization work, and that $30 million more would become available this year. This announcement was made in the newspapers, and headed a page of display advertising by various material dealers.

There were 106 inquiries in 4 weeks sent to the architects' society. In answer to the inquiries a questionnaire is returned and the inquirer is referred to the architect nearest his home. Care is taken that no architect is favored over others. There are 200 architects in the group. The architect confers with the prospect

(Continued on page 73)

News Flashes From Washington

Washington is moving with reasonable speed in getting the housing act into operation. Some details of the plan are now available. Modernizing is to play an important part under the recent act.

Federal Housing Administration Organizes

With the new Administrator, James A. Moffett, now in office, organization of FHA is under way. Quarters have been assigned in the New Post Office Building and a plan of organization announced. There is to be a deputy administrator in charge of each of the main activities which are: modernizing, and mortgage insurance and mortgage associations. The deputy to handle the modernizing side of the job is Arthur L. Deane, formerly president of General Motors Acceptance Corporation and recently connected with NRA. Mr. Deane is said to have a merchandising background. The other deputy is not yet selected. An advertising man, Ward Canady, head of the United States Advertising Company, is to be in charge of publicity. The act carries authority for the Administrator to select the necessary personnel to carry out his work. It is expected that organization will be complete and ready to go within 30 days. At any rate the modernizing division is to have priority.

Housing Under PWA

There is so much confusion about the duties of the several government divisions concerned with housing that PWA has made its position clear through a statement, which states that PWA is concerned only with slum clearance and the construction of low-cost multiple, group dwellings. In other words, apartment houses. It has nothing to do with modernizing through either the Housing Administration or the Home Loan Bank Corporation.

Incidentally, the housing division of PWA has made but little progress in recent months. It is difficult to find out just where its program now stands. News releases recently stated steps were being taken to speed it up, especially in New York where the local commissioner and PWA agents are stalemating each other.

Price Reductions

All through the discussions leading up to the National Housing Act there were suggestions that prices would have to be reduced in order to make a building construction program go. Now that the act is passed these suggestions are being renewed. Lumber reductions have been announced. The suggestion is that both labor and material prices be cut. No evidence as yet to how great pressure will be exerted or how aggressively the suggestion will be pushed.

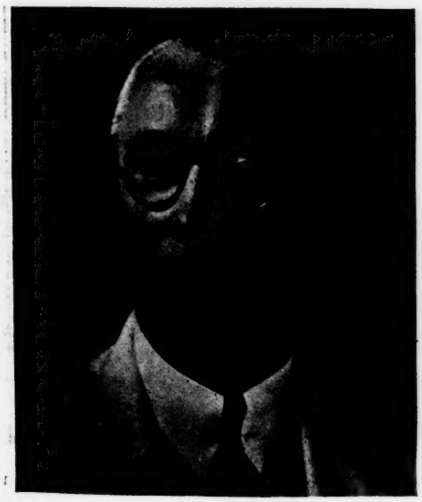
Reconditioning Applications

Even though loans for reconditioning through HOLC can be made only to restricted classes and on rather strict terms, nearly 300,000 applications have been filed in the short time since the amendment was passed. Applications averaged about $200. The reconditioning advisory service of HOLC is now in operation.

It is also announced that over 400 Federal savings and loan associations have been chartered.

Unit Air Conditioning Code Filed

Proposing to set up a division of the Fan & Blower Industry—an NRA code for the Unitary Air Conditioning Equipment Industry has been filed by the Unit Air Conditioner Manufacturers' Association. A public hearing was held in Washington August 1. As proposed, the code would govern not only the manufacture of those units but the engineering, design, sale, erection, repair, servicing, and installation as well. Control systems and control contractors are exempted. Unit air conditioners to be included are those of not over 10,000 c.f.m. capacity and shipped substantially complete or built and shipped in sections so that the only field work necessary is the assembling of the sections without field fabrication.



To the left is Daniel E. Casey, in charge of the nearly-completed Real Property Inventory. In the other view is shown James A. Moffett (in the white suit) head of the Federal Housing Administration. In profile is Marvin McIntyre, secretary to the President.

Grill Modernized with $7500 Cooling Plant

THE air conditioning of the Ogden Grill in Chicago furnishes an excellent example of the varied problems encountered in installing complete air conditioning apparatus in a high-class restaurant. The Grill, which occupies the second floor of an office building, is well known for its well decorated dining and barrooms. The problem was made especially difficult because of the decorations and also because of the small space available.

When the floor was originally adapted for restaurant purposes, the building walls were covered with a second wall which furnished the foundation for the interior decorations. Because of this second wall, street noises are cut to a minimum and the rooms are extremely quiet. The outside windows are not used and are painted black.

The design and installation of the ductwork required special attention to fit the conditions of the installation. The Circular Barroom and the End Dining Room made especially difficult problems as the ductwork had to be installed in the very narrow space between the outer and inner walls. To prevent damage to the wall decorations, the ducts were made narrow with sufficient height to provide the necessary capacity.

The outlets for the Circular Barroom were specially developed in order not to detract from the appearance of the walls. Two sets of five 3-in. tubes served to supply the air to the room. The supply outlets in the End Dining Room were adapted from built-in grilles which were formerly used in conjunction with unit heaters. In spite of the narrow space available splendid work was accomplished. Where the ductwork passed the windows, insulation was provided to prevent heating of the air in the ducts.

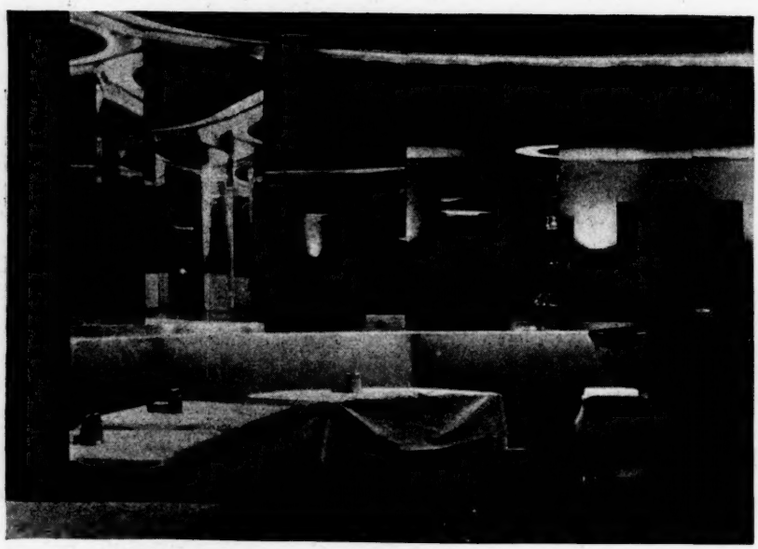
In the Men's Barroom and in the Center Dining Room, where conditions were not so exacting, the ducts were suspended from the ceiling. Registers, for supplying air to these rooms, were set into the ducts. After the installation was completed, the ducts were furred and decorated so that only the grilles were visible.

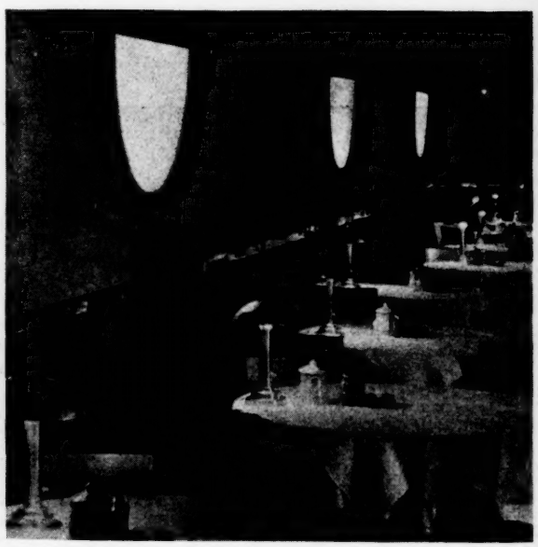
All of the apparatus was set in a fan room which is located on the third floor, directly over the Men's Barroom. Approximately 60% of recirculated air is up through a large grille, in the ceiling of the Men's Barroom, into a mixing chamber where it is mixed with the outside air. All of the air is then filtered. In back of the filters is a heating coil that is capable of heating air used during the winter from — 10° to 70°. The cooling coils are set directly in back of this and consist of two rows of 2 30-in. by 54-in. direct expansion cooling coils.

Cooling is accomplished by two refrigerators having a total capacity of 15 tons. The operation of the 5-ton compressor is controlled by a thermostat located in the return air chamber. When more cooling is required, the 10-ton unit can be put into service by means of a push button. The 5-ton unit is charged with approximately 16 lb. of freon, while the 10-ton unit has 20 lb. Automatic controls are provided so that when as much as 10 lb. of the refrigerant is lost, the compressors will be stopped. An individual refrigerant circuit is provided for each machine.

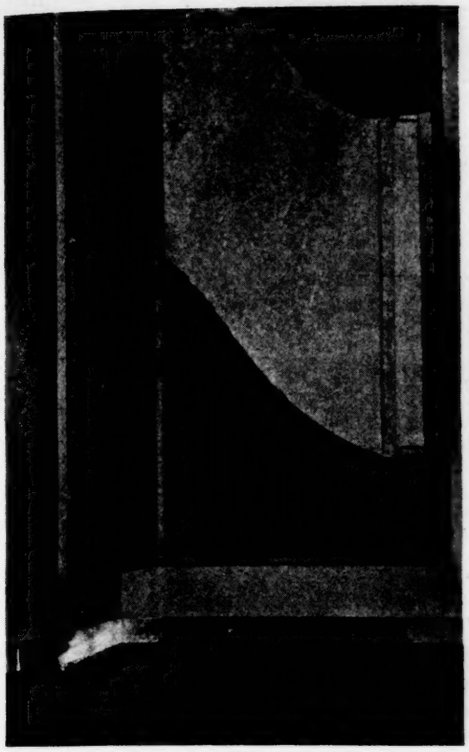
A 6000-c.f.m. fan, driven by a 2-hp. motor, forces the air through the ducts. Approximately 40 c.f.m. is supplied for each occupant.

The total heat gain of the system, when the inside conditions are 80° and 55% relative humidity and the outside 95° and 75° wet bulb, was calculated to be 128,670 B.t.u. per hr. The total cost of the installation, which was designed and installed by the H. S. Kaiser Company and the Midwest Engineering and Equipment Company, was $7500.



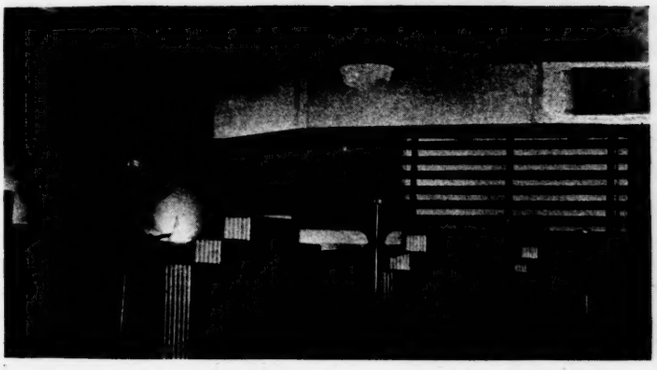


(Left) Circular Barroom showing a set of five special supply outlets. (Right) Three supply grilles in End Dining Room

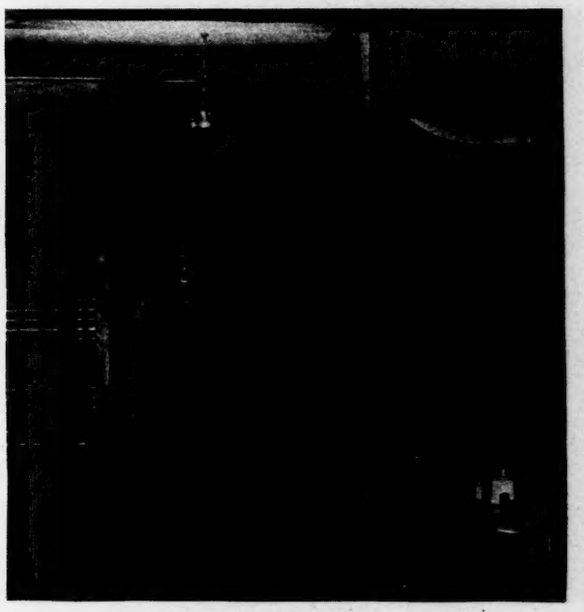


Ductwork between inner and outer walls

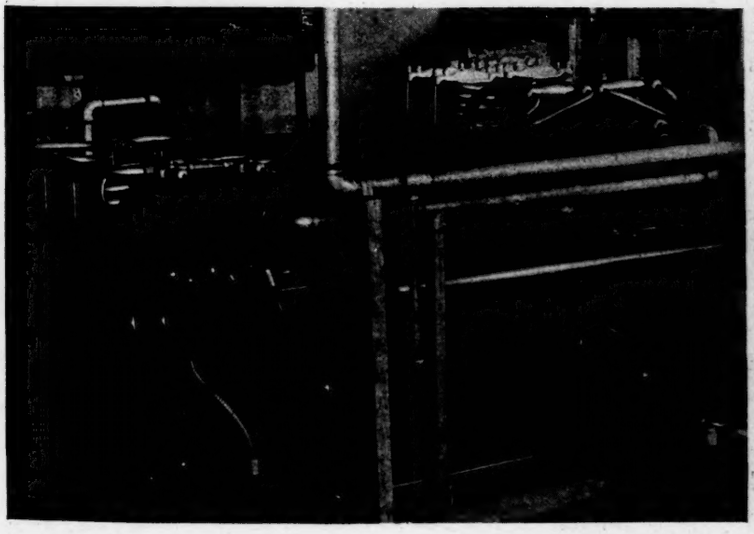
Sheet metal worker riveting refrigerator-coil housing



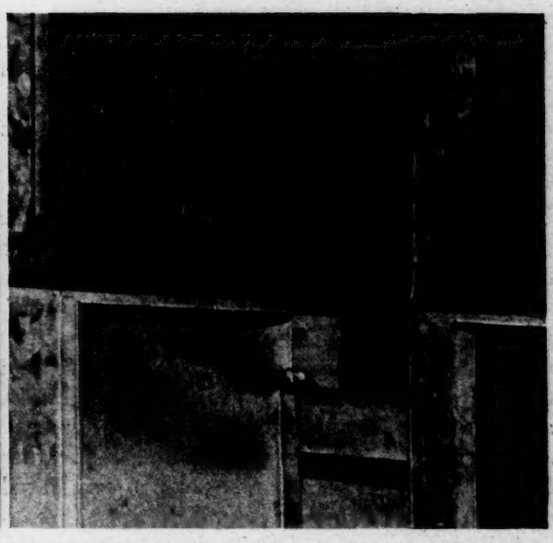
Supply duct in Dining Room before furring was applied



Supply duct and register in Barroom before furring was applied

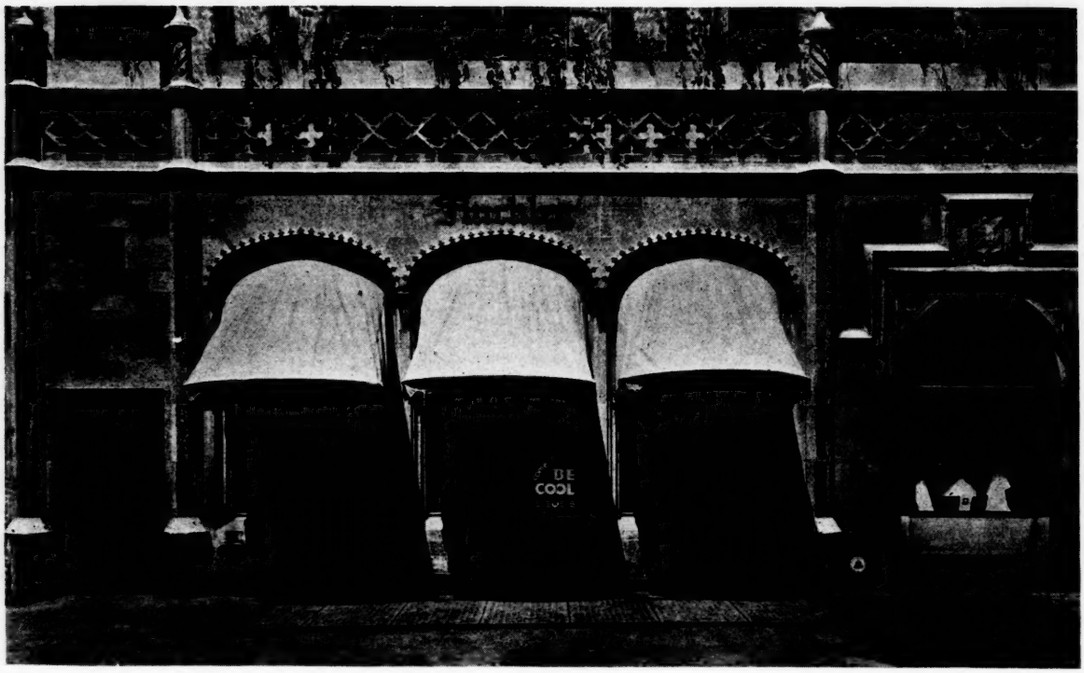


View of 5 and 10 ton freon compressors



Inside of plenum chamber with filter, steam heating and refrigerating coil

Exclusive Haberdasher Modernizes with Unit Coolers



By THOMAS J. CHARLES†

AT Finchley's men's haberdashery shop, Fifth Avenue at 46th St., New York, all of the sales department on the ground floor is conditioned by four horizontal, suspended-type air conditioning units, located as shown in the accompanying floor plan. With the units located in the general work area surrounding the sales space proper, valuable floor area in the sales space is not decreased, and the supply and return air grilles present the only indication that the store has been modernized, mechanically.

Refrigeration is furnished from a compressor located in the basement. The refrigerant is piped to each of the suspended-type units which, in turn, produce the desired cooling and dehumidifying effect.

The "Engineering Summary Design Data" table presents the essential engineering data, based on maintaining 80° dry bulb and 50% relative humidity throughout the conditioned area, when the outdoor dry and wet bulbs do not exceed 95° and 75°, respectively. As the store has an eastern exposure, the heating effect of the sun is negligible and was not considered. On the other hand, artificial lighting is used constantly and the heat given off by the lights must be absorbed. It is interesting to note that for each person accommodated, approximately 30 cu. ft. of conditioned air are provided. This averages 1¼ c.f.m. per sq. ft. of sales floor area.

A decided improvement has been noticed in the agreeableness of both the trade and the sales people. Not only that, but spoilage, due to perspiration stains, have been greatly reduced. The slight odor usually present where woollen goods are handled has practically been eliminated. The owners are more than pleased with the results obtained. In fact, they have recently placed an order for a similar conditioning system to take care of the third floor sales space.

Suspended-Type Unit Conditioners

Direct expansion of freon is used in the conditioning units. A dehumidifying surface temperature of approximately 40° is maintained. As the room air, which is recirculated, passes over the fin-type cooling surfaces, both the humidity and temperature are reduced. All of the conditioned air is circulated through the unit. It enters from four sides and travels from the rear of the unit toward the front, passing through the connect-

†President, Metropolitan Air Conditioning Corp.

ing duct to the discharge grille. The air distribution ductwork for the supply and return cycle consists of two sheet metal sections, each measuring approximately 18 in. × 8 in.

In order to properly distribute the conditioned air discharged into the rooms, sheet metal louvers or vanes were placed in back of each supply air grille. These grilles were located in the side wall, close to the ceiling. A return air grille, located close to the floor, permits the unit conditioner to withdraw air for recirculation. Supply air leaves the grille at from 65° to 70° dry bulb and a dewpoint in the neighborhood of 54°. This allows a pick-up of from 10° to 15° in dry bulb and 6° dewpoint. All of the air which passes through the conditioner does not come in intimate contact with the cooling coils. An averaging of temperature and humidities results which permits the mixture to be passed to the room directly without further mixing or tempering.

Condensation which forms on the surface of the coils during the dehumidifying process produces a slight air washing effect. A suitable drip pan and drain catches all of the condensate, which is passed to the plumbing system. The interior of the conditioner is rustproofed by applications of hot galvanizing and painting.

Each unit has a large, quietly operating, low-speed, propeller-type fan with a direct-connected motor. The entire assembly is spring suspended to eliminate vibration.

Automatic Compressor

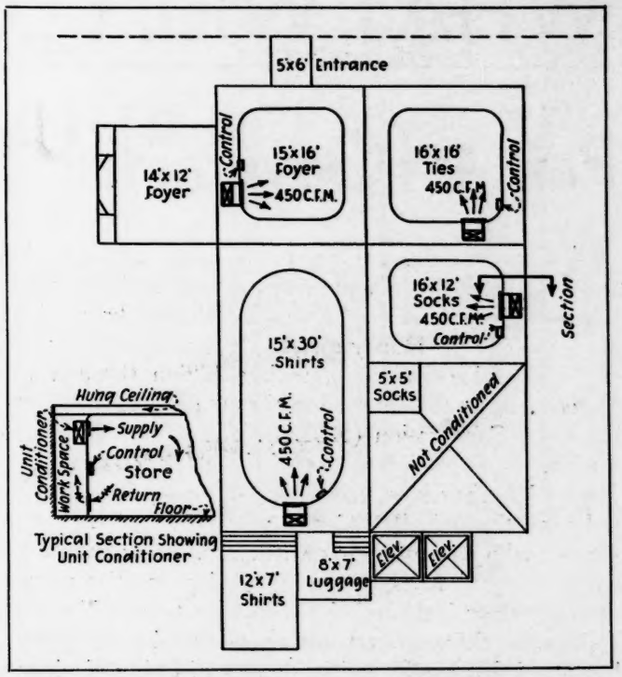
Refrigeration required to produce the proper degree of cooling and dehumidifying is furnished by a 4-ton, vertical, single acting, two cylinder compressor. Each cylinder has a 3-in. bore and stroke. It is driven by a direct-connected 5-hp. motor of the quiet operating type. Lubricating oil which may become mixed with the refrigerant is purged and extracted in an oil separator. About 40 lb. of freon are stored in the system. The compressor is set on an attached structural steel and concrete foundation. A layer of cork is installed to reduce the transmission of both noise and vibration.

City water at about 70° is used for condensing and about 2½ g.p.m. are consumed when operating at full load. The rate of water flow is controlled automatically through the action of an electric thermostat which actuates a solenoid valve.

Complete automatic motor controllers are mounted on the unit. A thermal overload protection device as well as a safety cut-out switch is also provided. These instruments protect the compressor from overcooling, which is both disagreeable and expensive.

Four supply and return lines of extra heavy copper tubing convey the refrigerant to the cooling units. Each of the refrigerant supply and return lines is tapped off a small header. Gate valves, placed in each branch line, permit the operator to cut in or out any of the cooling units for repairs. All of the fittings, elbows, tees, etc., were sweated to the tubing.

The entire piping hookup was tested in place under twice the normal operating pressure. It is important to note that freon was in the system during the pressure test. Thus, the system was tested for both safety



Floor plan of Finchley's showing location of controls and units together with a typical section showing unit conditioner

of high pressure and its ability to hold the refrigerant at this high pressure. This installation precaution is well worth remembering, as a leaky system is unsatisfactory and expensive to maintain.

Automatic Temperature Control

In order to better control and maintain the proper air conditions, a fully automatic, electric control system is included. The four unit conditioners are thereby automatically controlled. Their operation is regulated by means of an adjustable room-type, electric thermostat, which is interconnected with both the fan and compressor. This control is automatically placed in operation when the units are started. Incidentally, the fans, which are of the variable speed type, permit adjustments of the air volume. When cooling or dehumidification is required, the room thermostat completes an electric circuit which automatically opens a freon solenoid valve on the unit. This action permits the refrigerating gas to pass through the expansion valves into the cooling coils of the unit conditioners. Thus, the required cooling effect is produced and maintained as demanded.

ENGINEERING SUMMARY DESIGN DATA.

People	60
Floor area, sq. ft.	1,500
Cubage, cu. ft.	17,000
Air supplied, C.f.m.	1,800
Air change, min.	9
Refrigeration, tons	4
Total heat gain, B.t.u. per min.	760
Lights, watts	3,000
C.f.m. per person	30
C.f.m. per sq. ft. area	1¼
C.f.m. per ton refrigeration	450
Sq. Ft. floor area per person	25
Cubage per person	285

WHAT WILL I USE FOR MONEY?

Part 4—Government Finance for Modernizing

WITH the passage of the National Housing Act there are now two government agencies and two plans whereby government credit and cash can be used as an answer to the money question. The amounts potentially available are large, with a billion through the Housing Act and 300 million through the Home Owners Loan Corporation (HOLC). The plans and the requirements surrounding use of these funds are so different that they have to be considered separately.

Loans through HOLC are closely limited to home-owners who occupy their own homes. They cannot be used for anything except mortgaged properties valued at $20,000 or less, and do not apply to anything but residences. Moreover, the owner must be really embarrassed financially and in danger of losing his home in order to obtain money from this source. Loans for modernizing are limited to properties on which HOLC loans have already been made, to those eligible to such loans, or to those who own their homes clear of all mortgages but cannot get loans for modernizing elsewhere. The corporation management is permitted considerable discretion in granting modernizing loans but must be satisfied that the work contemplated is really necessary and justifiable. Application is made to the corporation by the individual property owner. An advisory service employed by the corporation passes on the application. If approved, the actual work is done by a contractor from a list of three selected by the owner, and is performed under the supervision of corporation employes. Loans are repaid on the basis of $7.91 per month per $1000 loaned, and paid out over a period of 15 years. In general, loans are limited to $2000 to one borrower although larger sums can be had in cases of original refinancing applications. Loans for less than $200 are ordinarily not economical.

It will be noted that the whole initiative in securing modernizing money from this source rests with the home-owner. There is little that the contractor, dealer, or engineer can do except to get himself recognized by the corporation as competent. A good local reputation naturally helps in this regard. The whole attitude has to be rather passive and we know of no cases where an aggressive salesmanship plan has benefited engineer or contractor interested in heating or air conditioning.

Housing Administration Loans

Modernizing money through the Housing Administration becomes available in a wholly different fashion than through HOLC. Loans are not made to individuals but to leading institutions such as banks or commercial loan organizations. The government offers to guarantee such agencies against loss on 20% of the total amount of modernizing loans which these institutions make. This provision is intended to offer an inducement to get the lending institutions to adopt a liberal policy on loans for modernizing. The individual does not deal with the Administration. Instead he acts much as he does when he wants to do modernizing with a loan financed through a commercial credit agency. An anticipated difference is that with the government money available and with the Administration taking part of the risk, the private lending agencies will be able to offer loans at cheaper interest rates and with a longer period for repayment than they are able to do now. This situation is also expected to work as an inducement to get the owner to borrow.

At this writing the exact terms and the precise methods to be used in arranging these loans are not available. It is expected, however, that regulations will soon be drawn up. It is pretty obvious that the amount of money which actually goes into modernizing from the Housing Administration funds will depend on the reaction of private lending agencies to the regulations.

The nature of the properties on which these loans can be placed also differs materially from those on which HOLC loans can be made. Properties do not have to be owner-occupied nor do they have to be residences. They must though be valued at $20,000 or less and no loan for more than $2000 can be placed. This arrangement permits lending to small commercial establishments and small apartment buildings.

Definite encouragement of modernizing is one of the purposes of the funds made available through the Housing Administration. It is therefore intended that use of these funds will not raise any unreasonable barrier to securing a loan. A reasonable credit rating and a good credit record is all that will be required with modifications to meet local requirements.

Now let us see how engineers and contractors are affected by this plan. Until it definitely gets working they are affected not at all, except that the great publicity given to the idea of modernizing has even now had its effects on getting this work going. Soon, however, it is expected that the wheels will begin to turn. HEATING AND VENTILATING is in close touch and will advise of procedure as soon as arrangements permit doing so.

This rather extended discussion of what answers there are to the money question when raised as an objection to doing modernizing shows that there is little or no real lack of money or credit. No doubt terms for borrowing can and will be improved. No doubt there are localities where there is a positive lack, or almost total absence, of financing due to local conditions. This though is subject to improvement. Considered as a whole, there seem to be ample answers to the question of "What Will I Use for Money?"

Changes in Boilers, Addition of Unit Heaters, Pay Dividends to Industrial Plant

HEATING modernization of a practical sort has been completed in the three-story 200 ft. × 400 ft. service building of the Mack-International Truck Company at Long Island City, N. Y., which now is heated with 29 overhead fan-type unit heaters comprising 20,000 sq. ft. of equivalent direct surface.

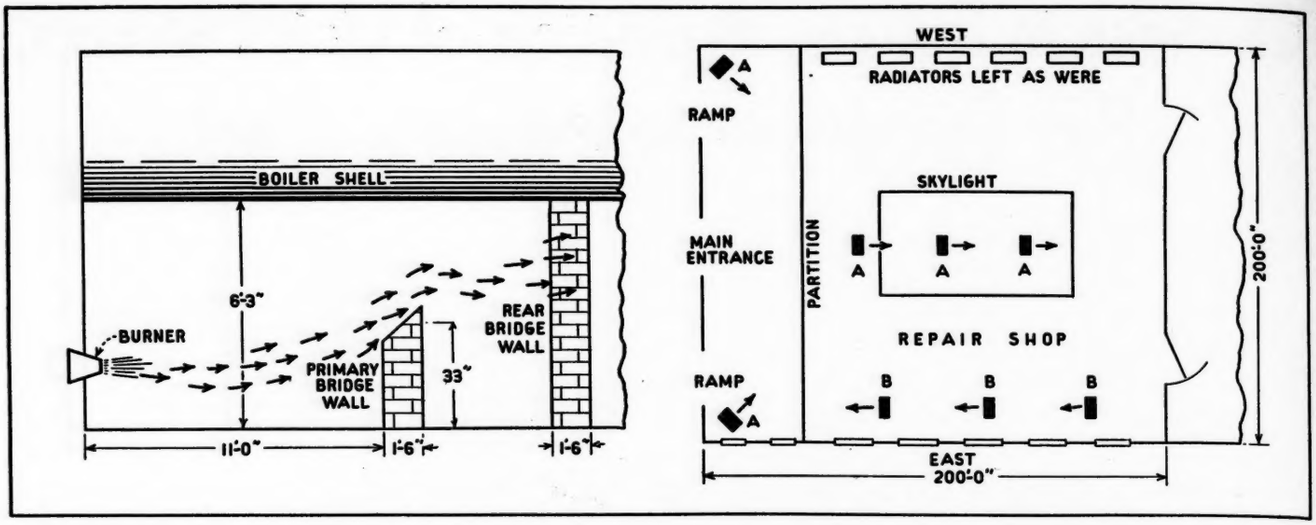
The remodeling came about chiefly through a desire on the part of the chief engineer to reduce what was regarded as excessive fuel consumption and still warm all parts of the building adequately. From an annual oil consumption of 300,000 gal., it is expected that the changes will provide good heating with less than 200,000 gal. of No. 4 commercial grade. Other modernization included the addition of a new bridge wall and the redesign of the existing wall in each of two 175-hp. boilers and the regrouping of supply mains so that zone control by chain-and-sprockets, operated in the basement boiler room, can be obtained.

As might be anticipated in a motor vehicle service building of this sort, almost one-half of the wall area is glass, and there are plenty of skylights. Tool benches, in some cases 175 ft. long, abut interior walls on three sides on two floors. These work benches made the problem of adequate heating troublesome when radiators were placed under them, for while the benches became excessively warm, room temperatures were found to be uncomfortably low. A large amount of pipe coil (25,000 lin. ft.) had been strung along inner skylight deck sides but floor areas beneath and immediately surrounding skylights rarely were sufficiently warm for comfort. In the paint shop, where room temperatures of 70° were desired, in contrast to 55° for most of the rest of the building, rapid and extreme weather changes caused cracking of skylight glass. When remodeling occurred a single unit heater, placed at one end of the skylight just below the bottom of the deck and pointed to fill the skylight area with warmth, proved an effective remedy.

Difficulty at the two 175-hp. boilers was chiefiy due to excessive oil consumption. Both burners are of marine-type horizontal discharge pattern. Flames impinged on a bridge wall about 15 ft. distant from the burners which were installed in front doors. To retard fire travel, reduce stack temperatures, and force heat nearer prime surfaces, the old bridge walls were changed and new, or what might be termed primary, walls added 11 ft. distant from burners.

Now the rear bridge walls extend from floors to boiler shell bottoms but are not as wide as the normal width. Spaces 2 ft. 6 in. are left on both sides of walls so that fire travel thus passes around them. Primary walls added are 3 ft. 3 in. high at their front and extend entirely across the fire box. The tops of the new walls were made 45° upward elevation, thickness of walls being 1 ft. 6 in.

Thus, the flames from the burners impinge on the primary bridge walls, rise over them, encounter the rear walls, then pass to the breeching around both sides of rear walls already described. This arrangement fulfills the objectives sought and has reduced stack temperatures approximately 200°. Judging from experience to date the boiler changes alone will save



Left—Elevation of bridge walls. Gas travel over primary wall and on either side of rear wall. Right—Plan of repair shop end of building, showing arrangement of unit heaters. "A" indicates 1080 E.D.R. unit heaters, "B" 646 E.D.R. units. Radiators were removed from ramp sides and east side. Pipe coils, formerly along decks of skylight, were also removed.

some 30,000 gal. of oil annually, as stated by the engineer.

Next in the modernization program came the disconnection of 4,000 lin. ft. of steam supply lines and so regrouping them that the operating engineer can turn steam on or off any major section of the building by manipulating line valves in the boiler room. The benefit, both from economy and convenience, is apparent when it is known that previously radiators and coils were left "on" 24 hr. daily because of the inconvenience of turning off each radiator individually. This meant under the old condition that the entire building was heated night and day. In contrast, now as many or as few unit heaters may be controlled as desired by means of snap electric switches on walls near units. Steam, instead of always being "on," is not turned on by the engineer until 6 a.m. This permits comfortable temperatures to be reached by 7:30 a.m. when work starts in some departments. Each unit heater is provided with a steam trap. All supply lines in the boiler room are insulated with four-ply air cell covering.

Here is a case where modernization has proved attractive to the owner as shown by the record of this manufacturer who has been steadily but gradually modernizing buildings located in most states. It is another example, too, of the kind of work which engineers and contractors can find and perform to their own advantage.

British Attack Theater Ventilation Problems

DEVELOPMENT of the motion picture as a form of entertainment has involved numerous problems in connection with the design of film theaters in the United Kingdom, not the least of which is that of efficient ventilation. The London County Council stipulates that 1,000 cu. ft. per hr. of clean air must be provided per person. This figure is arbitrary and whether it affords adequate ventilation must depend upon the design of the theater itself.

In many theaters abroad the system of ventilation adopted is to draw the air in near the roof (the air being heated in winter and cooled in summer). Such a system is recommended in certain instances, but where nearly everyone in the audience smokes, as is the case in the United Kingdom, this system is thought inadvisable. Another point which has been discovered is that in a hall where smoking is permitted, if fresh air is delivered near the top of the hall and extracted again immediately below, there is a tendency to produce smoke clouds which drift across the beam of light from the projector. This difficulty has been overcome in some of the largest and most modern British theaters by blowing in the greater volume of fresh air at a point midway between the stalls, floor, and ceiling, upward through the risers of the balcony, and downward from the stalls ceiling, and extracting at both the top and bottom on each side of the building. This method has proved successful, the air and smoke clouds from the occupants of the balcony being drawn upward and away from the projector beam to the sides of the hall, while the air and smoke from the stalls is drawn downward and also to the sides of the buildings, the audience's line of vision and the projector beam being in no way obscured by smoke. At the same time an even temperature is maintained in both stalls and balcony, instead of the upper parts of the house being several degrees warmer than the floor level, as frequently happens.

Copper and Brass for Heating Lines

By CARTER S. COLE†

PROGRESS is the outstanding characteristic of the engineering achievement of this age in which we live. No small part of our advancement has been due to seeking out the weak links in a chain and strengthening them by using better materials. That has been the underlying reason behind the greatly increased use of copper and brass pipe and tube in plumbing. It also is the reason now prompting progressive engineers to consider the use of these materials in heating systems where their higher first cost is more than offset by the savings in upkeep and replacement.

It is interesting to note the tremendous strides in the use of copper and brass pipe and tubing made prior to the year 1929, before building activity dropped off so sharply. In 1922-23 an average of about 16 million pounds of copper and brass were sold for this use, while in 1928-29 almost five times as much was required.

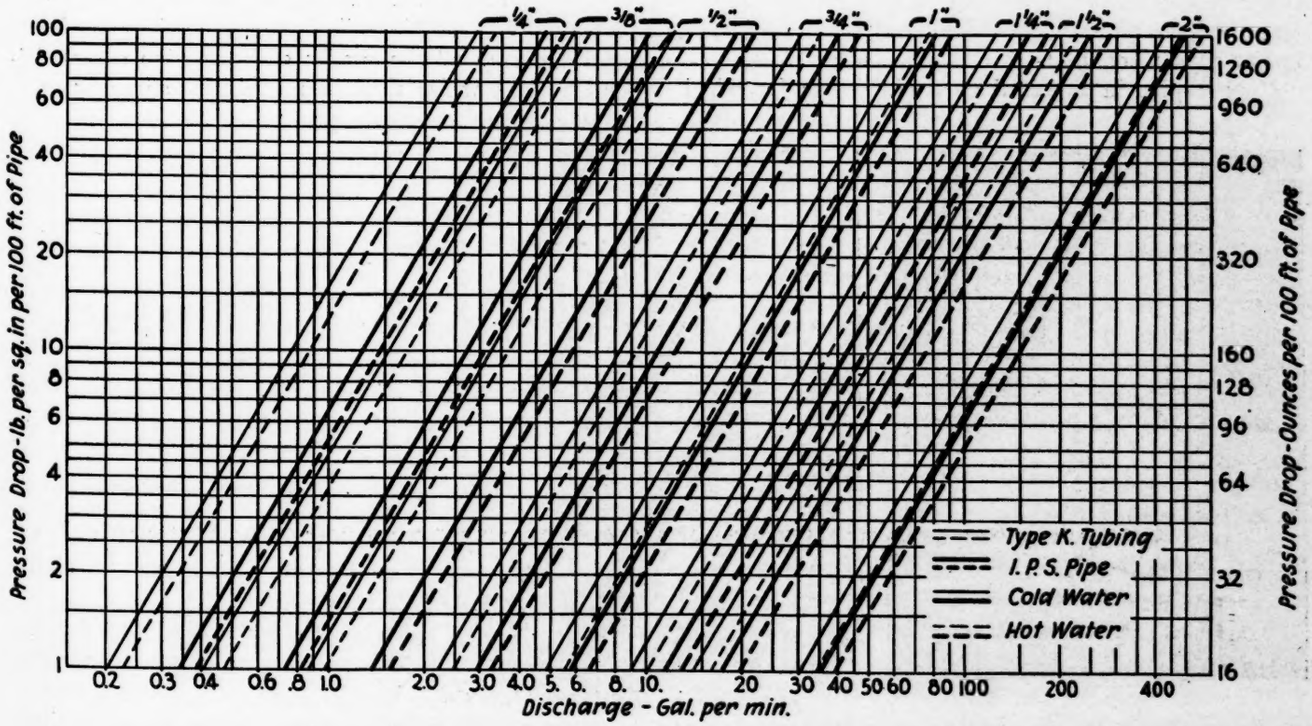
Today copper and brass are just beginning to be used to meet the corrosion problem which is present in heating systems.

For many years the scale-forming and rust-clogging properties of some waters have been recognized. However, it has been a matter of only a relatively few years in which adequate data as to the other characteristics of water supplies, which tend to make them corrosive, have been carefully investigated and information on these properties made available. Even those waters which are soft and will not form scale may be extremely corrosive to different kinds of piping material. This will especially be the case if there are large amounts of free carbon dioxide and dissolved oxygen present in a water that tends to be acid. This criterion for judging water, namely, its acidity or hydrogen-ion concentration, commonly called pH, is information which has been available for most supplies only recently, yet it is most important.

It is a condition of fact which we must face, that water supplies, in general, are becoming more corrosive rather than less so. There are a number of reasons for this. The first of these has to do with the source of the water, independent of its treatment. Deep-driven well waters are usually more corrosive than surface waters, and their use as a source of water supply is increasing.

Another source of increased corrosiveness in water supplies is from the treatment of the water before use. Many localities use a softening treatment to reduce the high temporary hardness of their water, and in general any water is more corrosive after softening than it was before. Aeration also is highly desirable from the standpoint of potability, but it, too, tends to add to the corrosive properties of the water. Again, filtration may remove those organic materials which may form a slimy, protective film on the inside of pipe

†Copper and Brass Research Association, New York.



Discharge capacity of copper and high brass plate. It is based on the Fair-Whipple-Hsiao Formula.

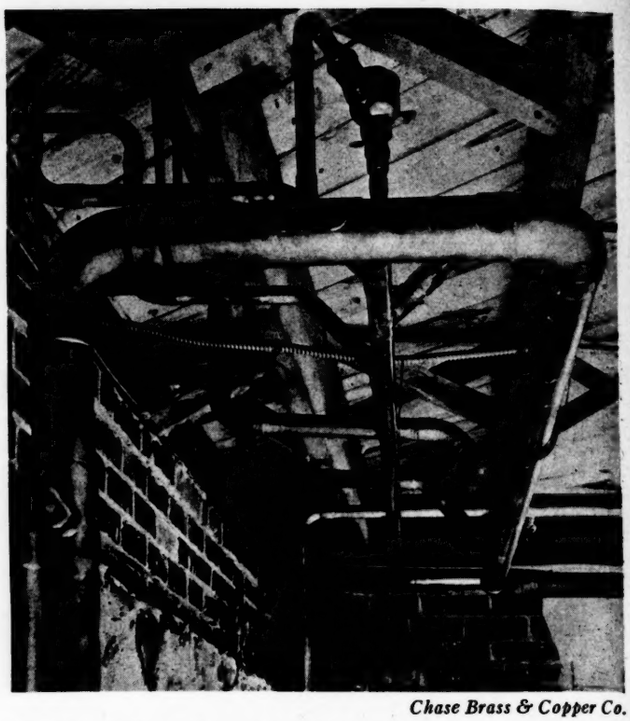
surfaces, and thus permits the action of the water on the pipes to be more corrosive.

Many waters which are not corrosive when they are cold, are corrosive when hot, especially those of the bicarbonate type. Again, many waters which are corrosive when cold are more corrosive when hot. These facts are of especial importance to the heating engineer or contractor in designing piping for a hot water heating system. On the other hand, with steam systems there is an increased tendency for non-condensable gases to be entrained with the steam and to accumulate in the return lines, due to condensation and lack of venting. This makes the return lines of steam heating systems particularly advantageous places for the use of copper or brass, for it is here that the greatest amount of corrosion usually takes place.

Brass and copper pipe offer a variety of choices to the user which can be adapted in accordance with the corrosive qualities of the water—factors which are known and available today. There is a proper grade of brass or copper pipe which should be used with any corrosive water. When a proper installation is made, long and satisfactory service will result.

In considering the standard commercial forms of copper and brass pipe available for use on heating lines, it is important to understand clearly that there are two systems or methods of dimensioning. Failure to keep this clearly in mind is apt to prove confusing. There is the pipe which conforms to the iron pipe size (I.P.S.) scale whose dimensions are identical with the dimension of iron pipe. Then there is thin-wall tubing which is the same in nominal size as iron pipe and as the I.P.S. copper and brass pipe but differs from them notably in the actual dimensions. In general, the tubing is slightly smaller in inside diameter, size for size, than is the corresponding iron pipe and is considerably smaller in outside diameter. Parenthetically, it is because of this that it is possible in certain sizes to use a smaller size of pipe covering than would be required if iron pipe were used.

Copper pipe in standard sizes (I.P.S.) is furnished



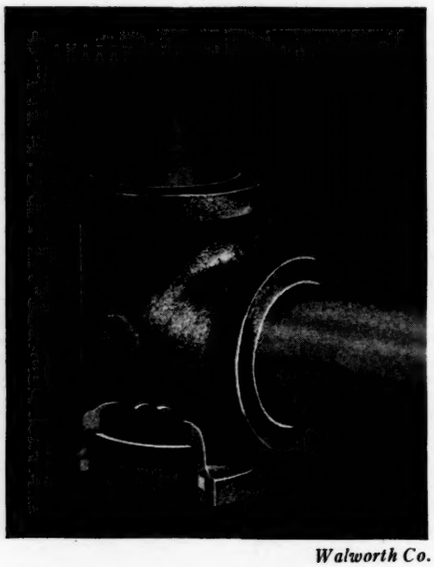
Chase Brass & Copper Co.

An installation of copper tubing with sweated fittings in a heating plant

in accordance with A.S.T.M. specification B42-33. The various grades of brass pipe conform to A.S.T.M. B43-33. This covers four grades of brass pipe whose resistance to corrosion usually increases with their increasing copper content. The nominal composition of these grades is as follows:

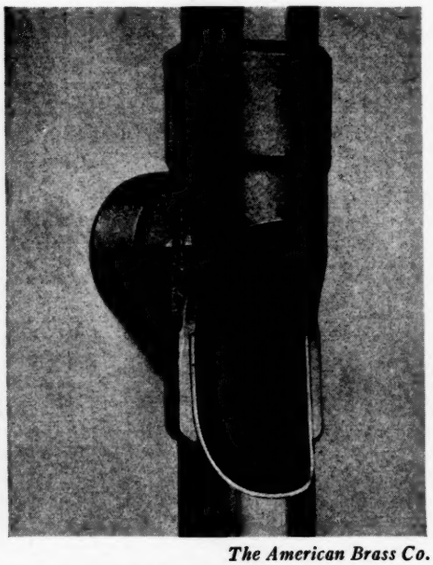
	Copper	Zinc	Tin
Muntz metal	60	40	—
High or yellow brass	67	33	—
Admiralty Brass	70	29	1
Red Brass	85	15	—

Copper pipe (I.P.S.) also conforms to Federal Specification WW-P-797, while Federal Specification WW-P-351 covers all the grades of brass pipe except Admiralty, for which there is no Federal specification.



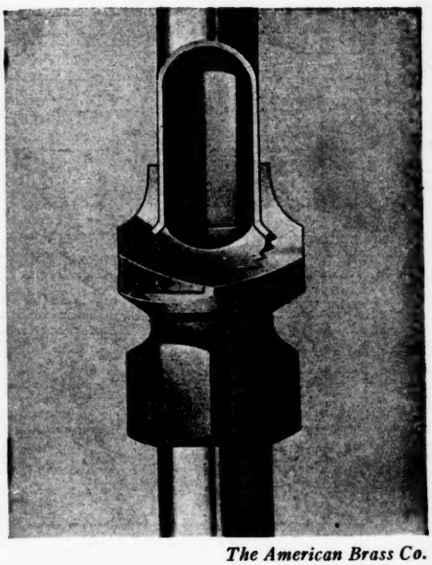
Walworth Co.

Cut-away view showing bronze fitting. The brazing alloy insert is shown



The American Brass Co.

Cut-away view of Type L copper tube with cast bronze fitting of solder type



The American Brass Co.

Cut-away view of a brass flared tube fitting

Historically, the Muntz metal or 60-40 piping was the first kind of brass pipe in general use, and it gives long and satisfactory service for mildly corrosive waters. Where waters are more severely corrosive we can use brass pipe with increasing corrosion-resistance as the copper content is increased. Thus, yellow brass and Admiralty are more resistant to corrosion than Muntz metal, and for extremely corrosive water conditions red brass or copper itself should be used.

Thin-wall copper tubing is made in three different series of gauge or wall thickness, corresponding in dimensions and designations to the requirements of Federal specification WW-T-799, and A.S.T.M. specification B88-33:

Type K—tubing designed for underground services and general plumbing purposes, with severe conditions.
Type L—for general plumbing purposes.
Type M—for general plumbing purposes with soldered fittings only, and for normal water conditions.

Tubing is also furnished in two tempers—soft and hard. The hard tubing is particularly adaptable with soldered fittings for use in new installations, especially horizontal runs. The soft temper is particularly adaptable for water services, for repair and replacement installations, and for vertical runs in building walls.

Methods of Fastening

Two distinct types of tube fittings have been developed. The first was the so-called compression or flared type fitting, wherein a flared or expanded end of the tube was tightly compressed between two threaded parts. These fittings are ideal for long lengths of soft temper copper tubing. A more recent development has been fittings with sleeve ends, into which the tube itself is telescoped. The joint is then made tight by sweating with solder, which flows freely between the tube and the joint, due to capillary action.

In adapting copper tubing with soldered fittings to heating service, there was some difficulty encountered in early installations, due to the creep of soldered joints. This was owing to the use of the ordinary 50-50 tin-lead solder, which is not satisfactory at some temperatures. Considerable study has resulted in the development of a number of improved solders. The best of these seems to be one composed of about 95% tin and 5% antimony.

This tin-antimony solder flows readily at temperatures in excess of 465°; well within the range of heat that can be applied to the fitting with an ordinary gasoline torch. This solder begins to harden, on cooling, at 465° and becomes rigid at 450°. This narrow plastic range of only 15° means rapid hardening, a very desirable property, as it reduces the chance of disturbing a joint while it is being made.

The commonly used 50-50 lead-tin solder melts at a lower temperature than the tin-antimony solder, but has a plastic range of 60°. It is not recommended for installations which might be subject to temperatures approaching 200°. For any unit stresses in the joint the tin-antimony solder stands up three to five times stronger at steam temperatures than the 50-50 lead-tin solder at room temperatures. Fittings sweated with the tin-antimony solder are particularly recommended for low-pressure systems but should not be used where the steam pressure may exceed 30 lb.

For carrying steam pressures over 30 lb. up to and including 125 lb. saturated, copper tubing with soldered fittings, properly sweated together with Sil-Fos solder, has a much greater resistance to the temperatures encountered in high-temperature steam systems. Sil-Fos is a hard solder, or brazing metal, with a melting point of about 1300°, which is 300° to 800° lower than the usual commercial brazing or welding materials.

Threadless fittings, using Sil-Fos solder, have recently been made available for the commonly used I.P.S. sizes of brass and copper pipe. This new development is of great interest to the heating engineer in the design of non-ferrous piping for heating systems.

Determining the Proper Size

With copper and brass pipe finding new applications in heating lines and with the new fastening methods and sizes, questions concerning methods of making proper use of these materials constantly occur to engineers and contractors who either design the lines or install them.

As all are familiar with the use of iron pipe, an easy avenue on which to approach the subject is to note in what ways the selection of size of copper or brass pipe differs from the corresponding methods when iron pipe is used.

With the I.P.S. sizes of copper and brass pipe one would suppose at first thought that the same sizes of copper or brass pipe would be used for a given radiator riser or main as for iron pipe. A common practice is to do this and to use the same tables or charts for sizing as are used for iron pipe. However, based on consideration of the decreased likelihood of scale-formation inside the pipe, the smoother surface, and on tests made by pipe manufacturers, there is justification in principle for a smaller size of pipe in some cases when using copper or brass on heating lines. There is no set rule for the allowance which is proper nor any general practice on the point.

One method where copper tubing is used is to allow 10% more radiator for a given size of main or riser with either gravity hot water or steam systems. Another is to vary the percentage with the pipe for steam systems, allowing 5% to 10% on the 1 in., 1¼ in., and 1½ in. sizes; 15% on the 2 in., 3 in., 3½ in., and 4 in. sizes, and 24% on the 2½ in. size. It will be seen that with this method there will be little or no difference in pipe sizes on radiator runouts, small differences on risers, and sometimes considerable differences in the size of pipe used on the larger size mains. This same method allows from 10% to 15% on gravity hot water, and in such systems the difference in nominal size for important mains may be as much as one pipe size.

This question of the proper size of pipe to use is important because of the proved effect which proper sizing has on circulation, adequate heating, and pipe cost. No general formula has been devised but some manu-

(Continued on page 72)

Gas-Cooled Restaurant Shows Low Operating Costs†

By HOWARD E. HOLTZ

THE first restaurant to be summer air conditioned with gas, located in Jamaica, L. I., showed low operating costs for the initial summer of operation. Because it is the only installation of its kind, tests were conducted and complete records were kept for a period of 45 days during the peak load period of the summer of 1933. The cost of operation averaged approximately 36 cents per hour during July and August and about 25 cents an hour during June and September.

The restaurant has a maximum capacity of 160 people with a floor area of 2500 sq. ft. The volume of the room is 27,500 cu. ft., or about 170 cu. ft. per person. The total heat gain, assuming a maximum of 125 people, is 65,700 B.t.u. per hr. Two factors that help to keep the heat gain low are the small window area and the fact that the restaurant is exposed to the sun only 3 hr. daily.

Dehumidifying unit (Fig. 1) is of the rotary type and contains approximately 176 lb. of silica gel in 24 beds. At any particular time, 11 of the beds are in the adsorption stream, removing moisture from air, eight are in the activation zone, having the water removed, two in the purging zone, being cooled, and three under the seals.

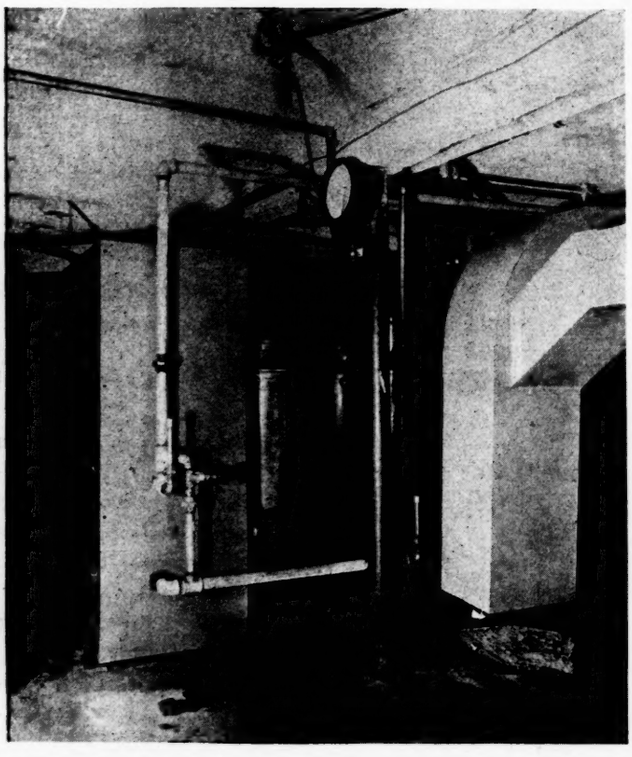
The entire unit is rotated once every 20 min. by a 1/20-hp. motor. A 1-hp. motor drives the fan which supplies the air for reactivating and purging. This air is heated by means of a gas furnace.

There are three coolers in the system, as shown in Fig. 3. All are of the copper-fin type. Primary cooler is designed to cool 2000 c.f.m. of outside air from 95° and 78° wet bulb to 64° saturated with a maximum inlet water temperature of 58°. The temperature rise of the water is 10°, from 58° to 68°.

The water then flows to the secondary cooler which is capable of removing the sensible heat of 3000 c.f.m. while lowering the temperature from 78° to 68°. The temperature rise of the water is approximately 5°, from 68° to 73°.

The aftercooler cools the dry air from the silica gel bed to 75° from a temperature of 120°. The hot water is then discharged into the sewer, although some con-

†Abstracted from a thesis submitted by the author to the Polytechnic Institute of Brooklyn, 1934. The author acknowledges his indebtedness to Joseph F. Quinn and the Brooklyn Union Gas Company.



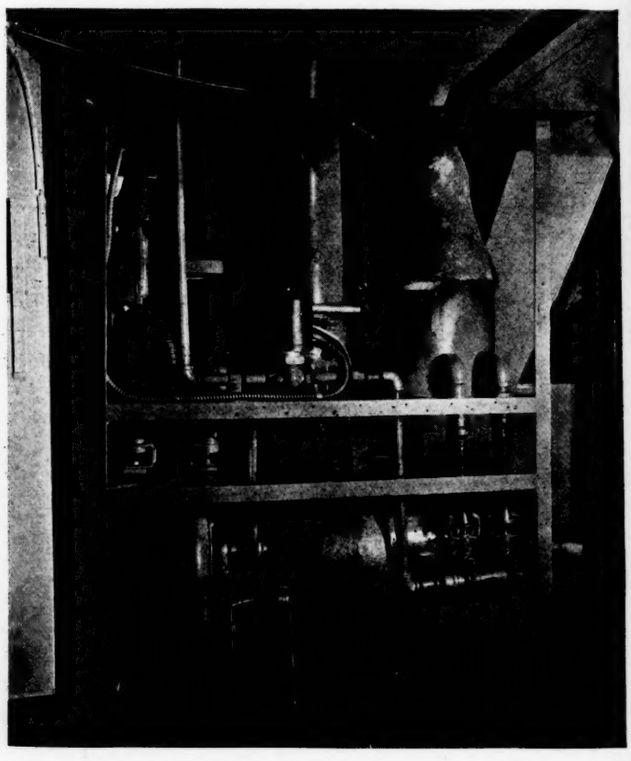


Fig. 1. (Left) Rotary silica gel unit with aftercooler on left. Fig. 2. (Right) Apparatus for reactivating silica gel. Gas furnace at right

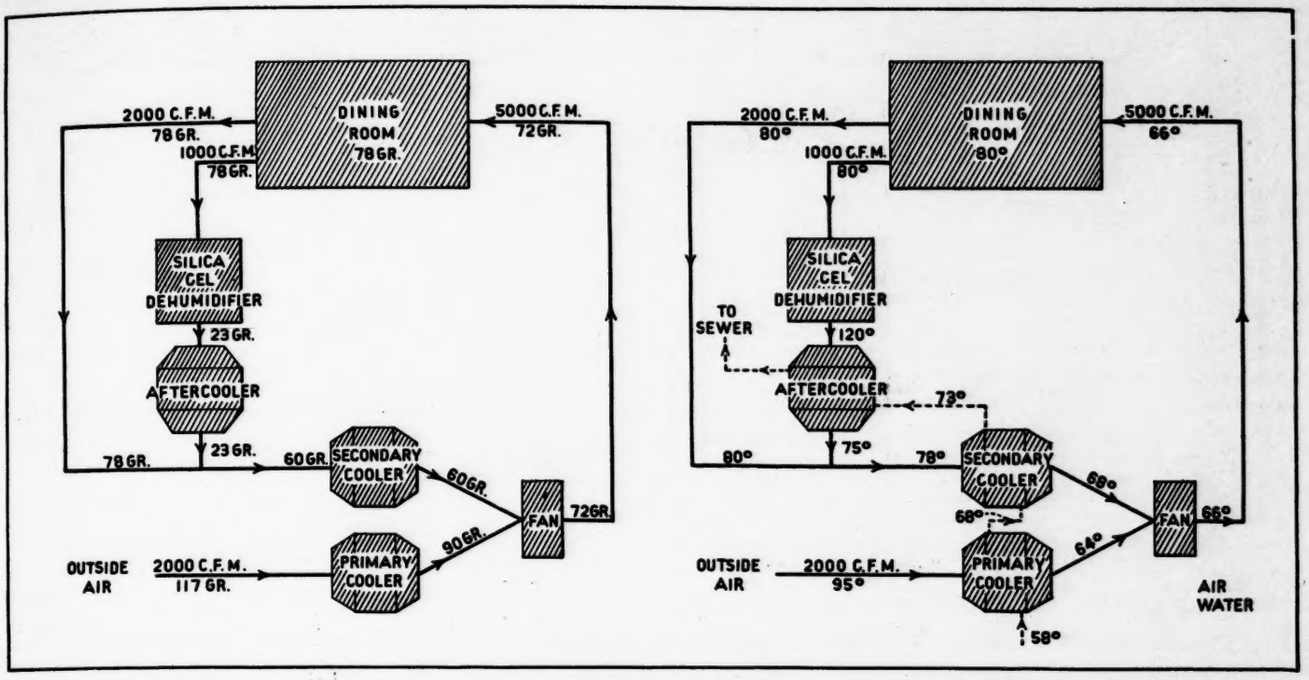


Fig. 3. Diagrammatic sketch showing operation of system under design conditions. At left, moisture conditions; at right, temperature conditions

sideration is being given to using it for hot water supply for the restaurant.

Starting and stopping the system is controlled by means of a snap-switch which is located in the dining room. Temperature is controlled by a thermostat which regulates the amount of water flowing through the cooling coils. A humidistat regulates the moisture in the air by varying the time of operation of gel unit.

The system was found to be extremely flexible in operation as dehumidification and cooling are controlled separately. Cooling is accomplished by using water from the city mains which has a maximum temperature of 58°. The highest water consumption was 17.3 gal. per min. and the refrigerating capacity of the system was calculated to be 14.7 tons.

Fig. 3 shows the operation of the system under design conditions; that is, with an outside temperature of 95° and 50% relative humidity. Approximately 3000 cu. ft. of air are withdrawn from the dining room at a temperature of 80° and 51% relative humidity. One third of this, or 1000 cu. ft., passes through the silica gel beds where some of the moisture is removed. The gel unit is shown in Fig. 1.

The latent heat given off by the adsorption of air moisture raises the air temperature to approximately 120°. Most of this heat is removed in the aftercooler. The air leaves the aftercooler with a temperature of 75° and is mixed with the remainder of the recirculated air. A secondary cooler then cools the entire stream of recirculated air to 68°.

Meanwhile, outside air is cooled in a primary cooler to 64°. Both streams of air are brought together and forced by a fan into the dining room. Five registers supply the conditioned air to the room. The main register in the front of the room delivers 3000 c.f.m. while two sets of side registers supply 1000 c.f.m. each.

The recirculating air, of which 1000 c.f.m. were drawn in through the floor register and 2000 c.f.m. through ceiling registers, varied 2° in temperature between floor and ceiling. That is, when the floor temperature was 79° the ceiling temperature was 81°. After an initial period of operation the floor register was shut off and all 3000 cu. ft. of recirculated air were drawn in from the ceiling. This arrangement proved quite satisfactory as it not only removed more heat but also produced a more uniform flow of air about 7 ft. from the floor. Smoke tests indicated that the cool air from the front and side registers produced adequate turbulence to overcome all dead spits.

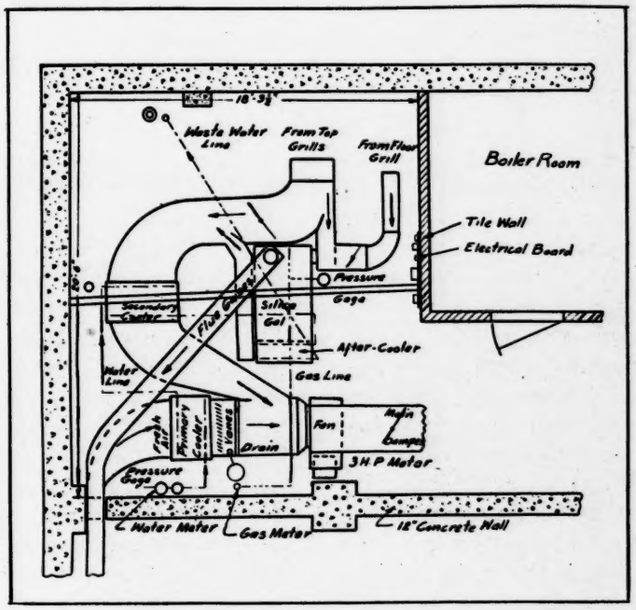
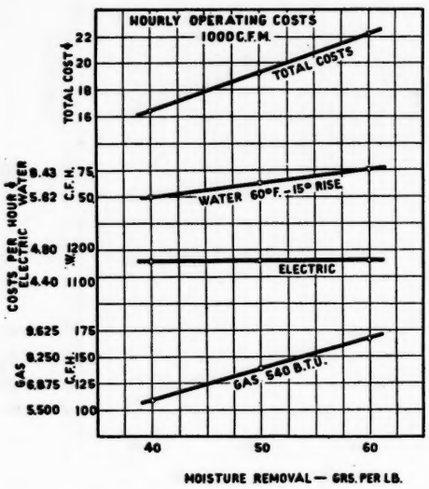
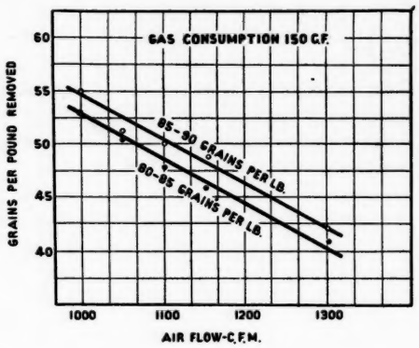


Fig. 4. Plan of apparatus room

Detailed data of operating costs for 45 consecu-





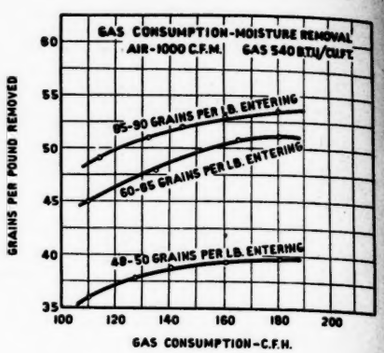

GAS CONSUMPTION-MOISTURE REMOVAL
AIR-1000 C.F.M. GAS 540 BTU/CU.FT.
85-90 GRAINS PER LB. ENTERING
80-85 GRAINS PER LB. ENTERING
48-50 GRAINS PER LB. ENTERING
GRAINS PER POUND REMOVED
GAS CONSUMPTION-C.F.H.

Fig. 5. (Left) Effect of various moisture removals on operating costs. Fig. 6. (Center) Moisture removal for various air flows and constant gas consumption of 150 cu. ft. per hr. Fig. 7. (Right) Effect of gas consumption on moisture removal.

tive days in July, August, and September were recorded. The total time of operation in this period was 433 hr. The average costs in cents per hour for the period were:

3.24 kw-hr. electricity at 4c per kw-hr.	13.0
121.1 cu. ft. water at $1.12½ per M. cu. ft.	14.0
172.5 cu. ft. gas at $0.55 per M. cu. ft.	9.5
Total average cost per hour, cents	36.5
Total cost for 45 days tested	$157.68

These figures show that this system of air conditioning should be particularly attractive to combined gas and electric utilities. Approximately 35% of the revenue went to the electric company, 38% to the water company, and 27% to the gas company which was responsible for the installation.

While the first cost of the apparatus was fairly high, it is expected that the price will be considerably reduced when the apparatus is made on a production basis. The total cost of installation including engineering supervision was $4000, or $275 per ton of refrigerating effect. The only thing not included in this figure is a 3-hp. motor which was salvaged from the old ventilating system.

Included in the numerous tests were many on the dehumidifying apparatus. Some of the results secured are particularly valuable for showing the operation of the silica gel unit. Figs. 5, 6, and 7 show graphically the effect of various conditions on the operation of the apparatus. Increasing the quantity of air flowing through the unit (Fig. 6) does not increase the total moisture removed in pounds per hour. Increasing the gas consumption (Fig. 7) does, however, have some effect on the moisture removed per pound of air. A 50% increase in gas consumption, above 120 c.f.h., increases the moisture removal only 10%.

The graph appearing in Fig. 5 shows some interesting facts. The water consumption increases with the moisture removal because of the larger amount of latent heat that has to be removed. Electric consumption remains the same because it is used only to drive the fans and the quantity of air is constant in this test. The gas increases considerably because more heat must be supplied to the gel to remove the additional moisture that is deposited there. The top curve on the graph shows that for a 50% increase in moisture removal, from 40 to 60 gr. per lb., the cost increases only 35%.

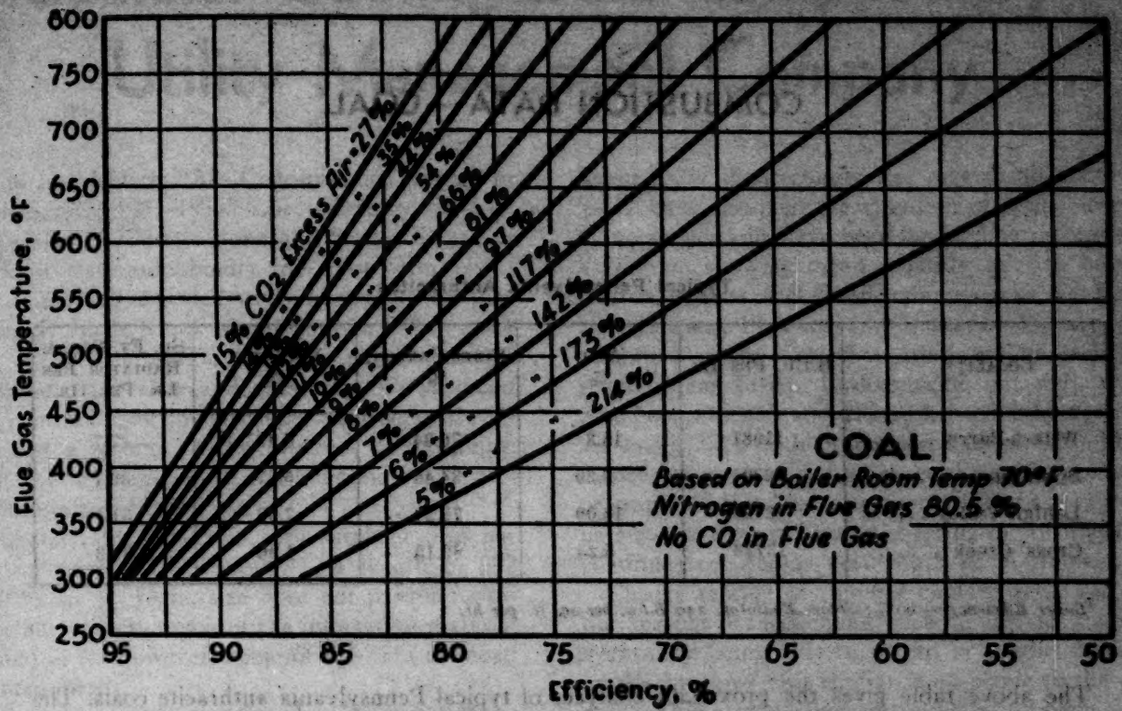
Hydraulic Coupling Saves 27% on Forced-Draft Fan Power

WHEN Philadelphia Electric Company engineers were considering the 165,000-kw. extension to the Richmond Station, it was decided that possibly a constant speed motor with a hydraulic variable speed coupling might better meet the requirements where speed adjustment is required than would variable speed motors. With this object in mind, a hydraulic coupling was installed on one of the forced-draft fans and an extensive series of tests conducted on it and on another fan in the same service, but driven by a wound-rotor variable speed motor.

There is no mechanical coupling between the driving and driven parts of the coupling. The driving part is keyed to the motor shaft and acts as the impeller of a pump to deliver fluid to the driven part, which may be considered as a water wheel. Oil is the driving fluid and is continuously circulated through the coupling. The difference in speed between the input and output parts depends upon the amount of oil in the coupling. With the coupling full, slip is less than 3%.

Conclusions that may be drawn from the tests are that a saving of about 25% may be made, compared to controlling the air flow by adjusting the motor's speed and damper position. A range of fan-speed control of from less than 20% to over 97% of the prime mover speed can be obtained. After a period of operation covering about one year, no serious operating troubles have been encountered.—*Power*

COMBUSTION DATA—COAL



Explanation of Boiler Efficiency Chart

The boiler efficiency chart shown above gives the approximate efficiency for a coal furnace when the percentage of carbon dioxide and the flue gas temperature is known. For example, assume the temperature of the flue gas to be 500° with a carbon dioxide content of 8%. Follow a horizontal line from the 500° point on the vertical scale to the 8% carbon dioxide line. Then drop a vertical line to the efficiency scale. The figure obtained, 79.5%, takes into account the heat loss due to excess air and flue gas temperature. It does not allow for losses due to moisture in the coal or air, carbon monoxide in flue gas, radiation, or carbon in ash.

Losses due to moisture are generally small, less than 1%, and can be neglected. Those caused by incomplete combustion with corresponding CO in the flue gas, are of much greater importance and vary with the per cent of CO_2 in the flue gas. For instance, when there is 15% CO_2 in the flue gas, each per cent of carbon monoxide will cause a heat loss of approximately 4%. With 10% CO_2, each per cent of CO results in a heat loss of 6%, and for 5% each per cent of CO causes a loss of 11%.

There are no methods by which the radiation losses may be easily computed. They may range from 3% to 20%. The heat lost in the ash is directly proportional to the amount of unburned carbon in the ash.

Sizes of Anthracite Coals

Name of Sizes	Will Pass Through Mesh of	Will Not Pass Through Mesh of	Min. Size of Grate	Min. Depth of Fuel Bed
Buckwheat No. 1	⅛ in.	¼ in.	—	—
Buckwheat No. 2	⅛ in.	¼ in.	—	—
Rice	¼ in.	½ in.	—	—
Pea	⅝ in.	⅛ in.	—	—
Chestnut or Nut	1¼ in.	⅝ in.	up to 30 in.	up to 15 in.
Stove or Range	1⅝ in.	1¼ in.	17 in.	16 in.
Egg	2¼ in.	1⅝ in.	25 in.	20 in.
Broken or Grate	4 in.	2¼ in.	25 in.	20 in.

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COMBUSTION DATA—COAL

Typical Pennsylvania Anthracites

Locality	B.t.u. Per Lb.	Ash, %	Fixed Carbon, %	Volatile, %	Sq. Ft. Steam Radiator Per Lb. Per Hr.[1]
Wilkes-Barre	11081	15.3	76.94	6.42	27.7
Scranton	12294	9.20	84.46	5.37	30.7
Lehigh Valley	12423	16.00	75.20	7.36	31.1
Cross Creek	13723	5.23	89.19	1.96	34.3

[1]*Boiler Efficiency = 60%; Steam Radiator, 240 B.t.u. per sq. ft. per hr.*

The above table gives the proximate analyses of typical Pennsylvania anthracite coals. The proximate analysis of a fuel gives the percentage by weight of fixed carbon, volatile matter, moisture and ash.

Another type of analysis which is frequently used is the ultimate analysis. This gives the per cent by weight of the various elements composing the fuel. Such an analysis is usually reported on the dry sample as 100%, and the per cent of moisture in the original sample is given separately.

Hand-Firing Methods for Anthracite Coals

1. Whenever new fuel is added, shake the grates gently until the first red coals appear. This will enable air to reach the fire and prevent the formation of clinkers. The fire should never be poked as this will tend to bring the ashes to the surface of the fire where they will be fused into clinkers.

2. Ashes should never be allowed to accumulate in the ash pit as they will prevent the air from reaching the fire and may cause the grates to burn out. See that the ashes are removed at least once daily.

3. Maintain a deep bed of fuel in the furnace at all times. This will give the most economical results. In extremely cold weather heap the coal in the center of the fire in the form of a cone. The fire burning around the outside of the coal will consume the volatile gases and deliver the maximum heat to the boiler surface.

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H. & V.'s REFERENCE DATA—38

Summer Cooling Data Compiled by Utility Management Company

WHEN last March "Air Conditioning, Report to Client Companies, 1933-1934" was issued by the Operating Division of Electric Bond and Share Company, New York, it was undoubtedly the most comprehensive, best edited and digested study of the subject that had appeared. Little which would interest utility managements escaped attention, for the scope included sales, planning, a review and summary of rates and revenues from existing installations, equipment developments, and a resume of the progress of technique. Moreover, the organization of the huge mass of material was admirably carried out.

Unfortunately, the report is a private one and not available for general distribution. Its length of 292 pages of 8½ in. × 11 in. size does not permit reproducing for our readers much of the interesting material incorporated in it. However, some of the data included are reprinted here.

The client companies reported 150 installations which might be classified as commercial and industrial. Reasonably complete data supplied on 118 of these permitted construction of a table showing the load characteristics of these by important groups. Table 1 has been abstracted from the table which appears in the report. The figures can be used in general estimates but are not valid when applied to particular cases as they represent averages of the results reported from all the installations in each group.

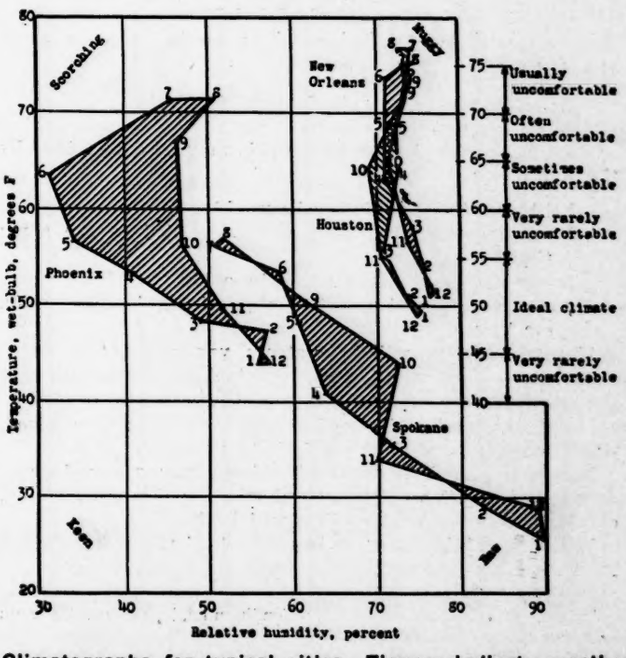
TABLE 1

Type	Size or Volume Air Conditioned in Number of Seats or M.c.f.	Air Conditioning Load: Connected Load—hp.	Maximum Demand—kw.	Daily Consumption—kw.-hr.
With Mechanical Refrigeration				
Theaters	2000 seats	250	150	1300
	475 M.c.f.			
	Units per seat	0.125	0.075	0.65
	Units per M.c.f.	0.5	0.3	2.7
Restaurants (Separate)	75 M.c.f.	75	45	450
	Units per M.c.f.	1.0	0.6	6.0
Restaurants (In Hotels)	75 M.c.f.	75	45	750
	Units per M.c.f.	1.0	0.6	10.0
Department Stores	1200 M.c.f.	360	240	2160
	Units per M.c.f.	0.3	0.2	1.8
Retail Stores	50 M.c.f.	35	25	200
	Units per M.c.f.	0.7	0.5	4.0
Banks	500 M.c.f.	250	150	1200
	Units per M.c.f.	0.5	0.3	2.4
Office Buildings	800 M.c.f.	400	240	2400
	Units per M.c.f.	0.5	0.3	3.0
Without Mechanical Refrigeration				
Theaters	1000 seats	25	20	150
	Units per seat	0.025	0.02	0.15
Department Stores	1200 M.c.f.	30	24	180
	Units per M.c.f.	0.025	0.02	0.15
Banks	500 M.c.f.	40	25	250
	Units per M.c.f.	0.08	0.05	0.50

Attempts to compare the summer climates in different parts of the country, as regards air conditioning loads, have occupied the attention of many people and many suggestions have been made. The report contains a diagram showing mean monthly relative humidities plotted against wet bulb temperatures at Houston, New Orleans, Phoenix, and Spokane. The report calls attention to the fact that areas within each of the graphs mean little. It does bring out well, however, that New Orleans and Houston produce graphs which are much alike both in location and extent. This is a pioneering activity and no especial significance attaches to graphs of this kind at present. They are reproduced here as a matter of interest, bearing on a subject which continues to present very much of a problem.

Closely related to summer climate data, and one of the reasons for collecting such figures is the idea of eventually being able to record or predict cooling demands by some unit similar in principle to the degree-day. This also remains an unsolved problem. Before such a plan could be made workable it would be necessary to establish suitable base conditions. A study to find such a base, as made in New Orleans, is outlined. It was judged that in New Orleans 82.5° and 50% relative humidity was the point below which air cooling or dehumidifying would not be needed. Hour-to-hour temperature readings from weather records on days when a maximum of 82.5° was reached were plotted, and a curve drawn through them showed a mean daily temperature of 78°. After further analysis of temperatures it was established that the amount of cooling

(Continued on page 72)



Climatographs for typical cities. Figures indicate months of year.

Exactly What Does Your Bid on Air Conditioning Include?

By W. LINCOLN BOYDEN, JR.†

The author suggests an outline by which the designer and owner can determine whether bids from various contractors are comparable. This suggestion is intended to overcome such a condition as the author described last month in "Some Practical Aspects of Air Conditioning."

THE data given in Part 1 of this article[1] illustrated some of the difficulties of getting two or more air conditioning contractors to bid on the same thing for residential work, and pointed the need of fixing a definite program for the air conditioner to meet in order that bids may be based on the same general conditions. This part of the article describes one way of fixing on such a program, and then gives, in outline form, a specification which will include these main requirements, calling for certain results for a residential, central type installation. A list of questions is put in for the bidder to answer to show how these results are obtained with his particular apparatus. It is thought that a specification of this nature provides a yardstick that can measure the relative good and bad points of the various machines under consideration. In order to avoid the hazards of divided responsibility, the specification includes besides the air conditioner a boiler, a burner, and a duct system, thus calling for a complete job under one contract.

The first step toward determining the main requirements of an air conditioning program is for the owner, with or without an independent engineer, to answer the following questions:

Will oil, coal, gas, or coke be used for fuel?

Are the conditions such that a split, or direct, or either system be used?[2] The answer to this may be determined by the following:

- **Will any direct radiators be used?**
- **Is the service hot water to be supplied at the same time?**
- **Is the system to operate continuously?**
- **Are there special conditions requiring booster, coils, etc.?**

If a split system, will it be steam, vapor or hot water?

Are any special ventilating conditions to be made, or will the usual number of air changes per hour be sufficient?

Is an air washer insisted upon? If washer is desired, what percentage of the time is it to operate?

Is summer cooling required? If so, how many degrees drop? Are local conditions such that cold water, steam, or electrically-operated cooling will be best?

Will dehumidifying as a by-product of the refrigerating system be sufficient, or is a definite amount of dehumidification to be insisted upon?

Has the owner any particular requirements regarding the location of the ducts and grilles? Are there any locations where the owner definitely does not want the grilles or ducts to be located?

Following a conference with the owner, the next step is to compute the heating and cooling loads so that all bidders would be working on the same requirements. The minimum air volume delivered against a given static pressure should also be determined to insure adequate circulation.

Having thus outlined a program, the question decided can then be entered in the following specification and sent to the air conditioning concerns still eligible to bid, with some assurance to the owner that bids received will represent fairly accurately the job he wants.

Heating Plant—Load on the boiler and/or burner to be .....B.t.u. per hr.
Load on conditioner to be.....B.t.u. per hr. (Loads to be computed in terms of delivery to room)
Capacity of burner.....B.t.u. per hr.
Make of burner .....
Horsepower of burner motor.....
Name, grade, and/or heating value of fuel used.....
Capacity of boiler.....B.t.u. per hr. (Indicate whether steam, vapor, or hot water.)
Type of boiler.....
Make of boiler.....
Capacity of heat exchanger.....B.t.u. per hr.
Type of heat exchanger.....
Cooling plant—Load on heat exchanger.....B.t.u. per hr.
Maximum temperature of water available is.....°F.
Capacity of heat exchanger.....B.t.u. per hr.
Type of heat exchanger.....
Source of cooling.....
Mechanical refrigeration....manufacturer's name.....
Rating in tons .....
Gal. waste water per hr. .....
Motor hp. .....
If other type cooling, indicate type.....
Manufacturer's name .....
Rating in tons .....
If steam jet, lb. of steam per hr. .....
Number of pumps used?
Make of pumps, motor hp. of each?.....
Temperature of air leaving exchanger.....°F.
Cleaning—Is all air passing through system to be cleaned?
Name of filter.....
Filter model .....
Total area of filter, sq. in. .....
Resistance to air flow, clean.....in. S.P.

†Office of Kilham, Hopkins & Greeley, Boston.

[1] "Some Practical Aspects of Air Conditioning," page 19, HEATING AND VENTILATING, July, 1934.

[2] The author refers here to a split system as one in which direct radiators would be used for heating, but the ventilating, or cooled air, would be circulated by a separate system.

Resistance to air flow, dirty.....in. S.P.
How are filters cleaned?.....
Estimated frequency of cleaning or replacements.....
Cost of replacements.....

Air Washers **are required and are to operate..... % of the time**

Make of washers .....
Type of washers .....
Waste water, g.p m. .....
Guaranteed maximum over-run of humidistat setting..%
Maintenance requirements for cleaning.....
If separate pump is used, give make and hp. motor. .....

Humidifying. **House air to be maintained at 25% to 50% relative humidity as selected by humidistat.**

Type humidifier .....
Maximum amount of water evaporated per hr. .....
Waste water, gal. per hr. .....
Maintenance requirements .....

Dehumidifying. **Relative humidity of house air in summer to be.....below outside reading.**

Under following conditions, what inside relative humidity would you guarantee with cooling system you propose to use, and describe provisions: outside temperature, 90°; relative humidity 80%; inside temperature 75°, inside relative humidity .....

Circulation. **The system it is proposed to install will give an average of.....air changes per hr.**

(Designer specifies here whether air circulation is to be automatically intermittent or continuous.)

Fan delivery c.f.m. minimum .....
Fan delivery c.f.m. ¼ in. S.P. .....
Type of fan .....
Make of fan .....
R.P.M. of fan .....
Fan motor hp. .....
Is fan speed constant or variable? .....
Percent of time fan in operation: summer....winter....

Distribution System. **(Designer to furnish to bidders plan and description of proposed layout and location of ducts and grilles.)**

Supply grilles, location and sizes .....
Return grilles, location and sizes .....
Make, model number or design of grilles.....
(Note if any special conditions apply to any particular room such as over 70° heating of bathroom and under 70° heating of garage) .....
Material used in ducts .....
Gauge of duct material .....
Any provision for reduction of resistance to air flow?....
Any provision for elimination of noise in ducts? .....
What type dampers are furnished? .....
Bidder to fill in the following figures on which he has based his calculations:
Velocity of air at grilles.....
Maximum temperature of air at grilles when heating....
Minimum temperature of air when heating.....
Minimum temperature of air at grilles when cooling....

In addition it is suggested that the designer should specifically inform the bidders if the head room or area for the conditioning apparatus is limited, and to require the bidders to state whether the equipment they are bidding on will meet the area and head room limitations. The bidder should in turn give the designer information on the make and type of controls used in all parts; maintenance or service requirements of machines not mentioned in the outline, and the cost and scope of service contract per year.

The bidder should guarantee that the system shall not make objectionable noise, and should operate within a given tolerance of the thermostat and humidistat settings and should operate free of service cost to the owner for a year. In addition, he should state that the system will comply with all legal regulations and Underwriters' requirements.

The cost of the complete system as described should then be given and should include all tests, fees, permits, labor, and materials. If desired, this total could be broken down into the heating plant, conditioning plant, and cooling plant.

Stoker Sales Show Large Increase

A MOST remarkable showing has been made by stokers during the past few years. During a period when practically all other forms of business were decreasing, stoker installations have been increasing steadily. With the return of better conditions, the sales in this field have shown large increases.

Figures show that approximately 171% more stokers were sold in June, 1934, than in the same month in 1933. Total installations for the first six months of 1934 amount to 4255 units of less than 300 pounds coal burning capacity. This is an increase of 173% over the corresponding period in 1933 and 198% over 1932. If this increase is maintained, the total sales for 1934 will amount to over 22,600 units.

The largest number of installations are made in the residential size, that is, those burning up to 100 pounds per hr. In June, 1934, these amounted to 904 compared with 558 for last June. Total sales in this class for last year were 11,070 units.

The peak period of stoker sales occurs in August, September and October, reaching approximately 500% of the low period which occurs in March and April.

Sales of domestic oil burners for June, 1934 amounted to 4804 units which is less than 1% above June of last year. For the first six months of 1934, however, sales were 143% above the same period of 1933. Last year the total sales were 71,600.

It is estimated that the total number of domestic oil burner installations throughout the United States is approximately 900,000. The total number of coal stokers, not including industrial sizes, is variously estimated at between 50,000 and 75,000 units.

Contractors' Code Approved

Here is the full text of the Code for the Heating, Piping, and Air Conditioning division of the Construction Industry, approved July 25. It includes zoned minimum rates for journeymen, divisional code authority of 11 members. It is effective August 9.

Article I—Definitions

Section 1. (a) The term "Heating, Piping and Air Conditioning Contractors Division," or "this division," as used herein shall include the furnishing and installing of systems, or parts thereof, for steam and hot water heating, ventilating, refrigeration, air conditioning, power piping, industrial process piping, sprinkler piping, temperature control piping, high and low pressure boilers, stokers, oil burning units, pneumatic piping, hydraulic power piping, and all apparatus, appurtenances and piping systems in connection therewith, regardless of whether such piping conveys steam, water, air, brine, ammonia, oil or other fluids or other commercial products, or products in course of manufacture; and

(b) pipe covering and painting when required by, and included in, the contract for any of the services or operations described in paragraph (a) of this section, and not performed under sub-contract let by a member of this division; and

(c) sheet metal work when required by, and included in, the contract for any of the services or operations described in paragraph (a) of this section, and not performed under a sub-contract let by a member of this division; provided, however, that the work described in this paragraph shall be performed under conditions no less stringent than described in any Chapter of this code relating to Roofing and Sheet Metal Contractors, and provided further that no bids for such work shall be submitted under such Chapter or any assessment be charged thereunder against members of Heating, Piping and Air Conditioning Contractors Division.

(d) such branches or subdivisions of the services or operations included in paragraphs (a), (b) and (c) of this section as may from time to time be included under the provisions of this Chapter.

(e) the provisions of this Chapter shall not apply to any of the operations above mentioned when performed by a manufacturer on his own premises and by his own employees and not for compensation or hire but for such manufacturer's own use within the scope of such manufacturer's industry, as defined in the approved code of such industry, provided, however, that such operations are confined to repair and maintenance items chargeable to operating expenses and to minor items of replacement chargeable to capital expenditures. Nor shall the provisions of this Chapter apply to the supervision by supervisors and specially trained technicians at the site in connection with the installation of a manufacturer's product, provided such services are required to safeguard the manufacturer's responsibility for the performance of such product.

Section 2. The words "sprinkler piping" as used in this Article shall be construed as not including the installation of automatic sprinkler equipment for fire protection purposes, as such installations are under the jurisdiction of the Automatic Sprinkler Code.

Section 3. Home-owners and householders, including farmers, shall not be deemed to be included within the definition contained in Section 1 in their performance individually or by their permanent servants or other help of like character on their home premises of any services described in such definition; nor shall any such person, or any building owner or tenant, performing such services by his permanent employees and not for hire on or in buildings or structures owned or occupied by him, be deemed to be included in such definition.

The terms "permanent employees" and "permanent servants" as used in this section mean and include any employee or servant who is given regular and continuous employment for a period of not less than six (6) months.

Section 4. The term "combination bid" is herein defined as any bid including any work within this division, together with work not within this division.

Section 5. The term "Association" as used herein shall mean the Heating, Piping and Air Conditioning Contractors National Association.

Section 6. The term "journeyman steamfitter" is herein defined to mean any employee qualified by examination who has served at least five years as a learner in the steamfitting trade (either as an apprentice or helper).

Section 7. The term "apprentice" is herein defined as a learner of the steamfitting trade who is undergoing a definite course of training, which when completed will make him a journeyman steamfitter.

Article II—Hours, Wages and Conditions of Employment

Section 1. (a) In the Northern Zone, no journeyman steamfitter shall be paid less than $1.20 per hour; in the Central Zone, no journeyman steamfitter shall be paid less than $1.10 per hour; in the Southern Zone, no journeyman steamfitter shall be paid less than $1.00 per hour, and in all zones, no apprentice shall be paid less than $12.00 per week.

(b) The Northern Zone shall consist of: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Indiana, Wisconsin, Minnesota, Nebraska, Wyoming, Oregon, South Dakota, Idaho, Pennsylvania, Ohio, Michigan, Illinois, Iowa, North Dakota, Montana and Washington.

(c) The Southern Zone shall consist of: South Carolina, Georgia, Florida, Arkansas, Alabama, Mississippi, Louisiana, Arizona, Oklahoma, Texas and New Mexico.

(d) The Central Zone shall consist of: Delaware, Maryland, Virginia, Tennessee, Colorado, Utah, California, North Carolina, West Virginia, Kentucky, Missouri, Kansas, Nevada and District of Columbia.

Section 2. Watchmen shall not be permitted to work more than fifty-six (56) hours per week.

Section 3. Employees engaged in professional, executive, or supervisory work are exempt from the provisions relating to hours and wages of Chapter I and of this Chapter only when receiving over thirty-five dollars ($35.00) per week.

Section 4. No employee shall be paid at a lower rate of wages than provided in Chapter I of this Code.

Section 5. (a) All wages due shall be payable weekly in lawful currency or by negotiable check. These wages shall be exempt from any payment for pensions, insurance or sick benefits other than those voluntarily paid by employees. Employers or their agents shall not accept, directly or indirectly, rebates on such wages or give anything of value nor extend any favors to any person for the purpose of influencing rates of wages or working conditions of their employees.

The provisions of this section regarding payment of wages at the end of each weekly period shall not apply to persons employed in a managerial or executive capacity who earn not less than thirty-five dollars ($35.00) per week, nor to persons employed in clerical or office work who shall be paid at the end of pay periods not to exceed monthly periods.

(b) Every employer shall make reasonable provisions for the safety and health of his employees at the place and during the hours of their employment. Standards for safety and health shall be submitted by the Divisional Code Authority to the Administrator as soon as practicable after the effective date of this Code.

Section 6. No member of this Division shall directly or indirectly sublet (whether by the practice known as "lumping" of labor or otherwise) to any employee, other journeyman, helper or laborer, solely the labor services within the scope of this Chapter.

In no case shall a member of this Division avoid or evade the labor provisions of this Chapter by contracting his work to any person or persons subject to labor provisions less stringent than those provided in this Chapter.

Article III—Administration

Section 1. (a) A Divisional Code Authority is hereby constituted to administer this Code within this Division. The Divisional Code Authority shall consist of eleven (11) individuals, or such other number as may be approved from time to time by the Administrator.

(b) Seven (7) members of the Divisional Code Authority shall be members or representatives of the Association, appointed by its Board of Directors. The four (4) remaining members shall be initially selected on a fair basis from non-members of the Association within this Division by the Board of Directors, subject to review by the Administrator, the said non-members to serve until their successors shall have been selected (by a method of selection satisfactory to and approved by the Administrator), by the members of this Division who are not members of the Association.

(c) After said Divisional Code Authority has been duly established, the members thereof may, in manner and form required by law, incorporate in the State where the interests of said body are best served, provided, however, that said corporation is not organized for profit.

Section 2. Review of Acts of Code Authorities. If the Administrator shall determine that any action of the Divisional Code Authority or any agency thereof may be unfair or unjust or contrary to the public interest, the Administrator may, to the extent of his power under the Act, require that such action be suspended to afford an opportunity for investigation of the merits of such action and further consideration by the Divisional Code Authority or agency pending final action which shall not be effective unless the Administrator approves or unless he shall fail to disapprove after thirty days' notice to him of intention to proceed with such action in its original or modified form.

Section 3. It being found necessary, in order to support the administration of this Chapter and to maintain the standards of fair competition established by this code and to effectuate the policies of the Act, the Divisional Code Authority is authorized, subject to the approval of the Administrator:

(a) to incur such reasonable obligations as are necessary and proper for the foregoing purposes and to meet such obligations out of funds which may be raised as hereinafter provided and which shall be held in trust for the purposes of this Chapter.

(b) to submit to the Administrator for his approval within thirty days after the effective date of this Divisional Chapter, subject to such notice and opportunity to be heard as he may deem necessary, (1) an itemized budget of the estimated expenses for the foregoing purposes and (2) an equitable basis upon which the funds necessary to support such budget shall be contributed by members of this division.

(c) after such budget and basis of contribution have been approved by the Administrator, to determine and secure equitable contributions as above set forth by all such members of this division, and to that end, if necessary, to instigate legal proceedings thereunder in its own name, provided, however, that a member of this division shall be deemed in violation of this code only if he fails to pay such assessment after thirty days of the receipt of the notice of assessment.

Section 4. Only members of the division complying with this code and contributing to the expenses of the administration of this Chapter as provided in Section 3 of this Article shall be entitled to participate in the selection of the members of the Divisional Code Authority or to receive the benefits of its voluntary activities or to make use of any emblem or insignia of the National Recovery Administration. After the requirements of the Administrator have been complied with, non-payment by a member of this division of an equitable share of the costs of code administration to the Divisional Code Authority or to its properly authorized agency, constitutes a violation of this code.

Article IV—Fair Trade Practice Regulations

The following provisions are adopted as rules of Fair Trade Practice for members of this division, and any violation of said rules shall constitute an unfair method of competition and a violation of this Code:

(a) No member of this Division shall induce or attempt to induce the breach of a contract between a competitor and his customer, provided that nothing in this rule shall be taken to prevent a member of this Division who has quoted upon the plans and/or specifications involved from calling to the attention of the purchaser, with the approval of the Divisional Code Authority, even though contract has been made, that the plans and/or specifications upon which the contract has been awarded or the work as being installed do or does not conform in quantity or quality to the plans and/or specifications on which the interested member of this division has quoted.

(b) No member of this Division shall advertise, name, mark or bill materials, fixtures, apparatus, or installations as to quantity or quality in any manner which is intended to or does mislead or deceive purchasers.

(c) No member of this Division shall receive, pay or allow secret rebates, refunds, credits or unearned discounts, whether in the form of money or otherwise, or extend to certain purchasers confidential prices, special service, or privileges not specifically mentioned in his original specifications.

(d) No member of this Division shall agree to furnish or sell labor, materials, fixtures, apparatus or installations for any job at less than the estimated cost thereof. In connection with this rule estimated cost is defined as the sum of the estimated cost of labor including liability and compensation insurance, and cost of material including freight and cartage, filing fees and any other direct expense applicable to the job and an amount for overhead. The amount for overhead shall not be less than twelve and one-half per cent (12½%) of the combined cost of labor including liability and compensation insurance, and the cost of material including freight and cartage. It shall be a defense to any charge of violation of this paragraph if the party charged shall satisfy the Administrator that his bid was not less than the estimated costs of any other member of the Industry.

(e) No member of this Division shall substitute any materials, fixtures, apparatus or installations for the kind specified without written approval of the engineer or architect, if any, and the purchaser.

(f) No member of this Division shall give, permit to be given or directly offer to give, anything of value for the purpose of influencing or rewarding the action of any employee, agent or representative of another in relation to the business of the employer of such employee, the principal of such agent or the represented party, without the knowledge of such employer, principal or party. Commercial bribery provisions shall not be construed to prohibit free and general distribution of articles commonly used for advertising except so far as such articles are actually used for commercial bribery as hereinabove defined.

(g) No member of this Division shall make or cause to be made or published, any statement which is false or inaccurate, in any material particular, concerning the goods, prices, values, credit terms, policies or services of a competitor.

(h) No member of this Division shall accept or give securities, bonds, mortgages, stock, promissory notes, or other personal or real property, as whole or part payment for work or material, at other than its fair market value, to be determined in doubtful cases, by independent and competent appraisal.

(i) Second hand material, obsolete or outmoded material shall be offered and installed only as such.

(j) No member of this Division shall furnish plans and/or specifications for installation of work covered by this Code, for use of any owner or owners or his or their representatives for the purpose of taking competitive bids, except in accordance with the provisions of the Construction Industry Code (in Chapter I or in an Engineering Division Chapter) which takes jurisdiction over Engineering.

(k) No member of this Division when as an individual using the tools of the trade shall work a greater number of hours or charge for his service a lower rate than provided for in Chapter I or in this Chapter.

(l) To protect the public against inadequate installations, members of this Division shall install all work in accordance with the applicable municipal or state law then existing and, where not conflicting therewith, in accordance with the published Engineering Standards of the Association, except where otherwise required by definitely prepared plans and written specifications furnished by the owner or his authorized representative. When the welding process is used the work shall be done in accordance with the Welding Standards and Specifications of the Association. The standards of the Association mentioned in the paragraph shall not be binding upon members of the industry until approved by the Administrator.

(m) No member of this Division shall place (for the same material for a specific job for which he has the contract) blanket orders or future delivery contracts with more than one concern when the total so ordered is in excess of the material estimated to be required for such job. Future delivery orders or contracts for specific jobs shall contain sufficient information to identify definitely the job for which the orders are placed.

(n) No member of this Division shall be a party to the unfair practice of "bid peddling" or "bid shopping" as defined in Chapter 1 hereof.

(o) In competitive bidding, the following rules shall apply:

(o-1) No member of this Division shall submit bids to anyone not bound by this Code unless he expressly agrees to comply with the regulations governing an awarding authority provided in Articles VII of Chapter I hereof.

(o-2) In order to provide a check on the accuracy and fairness of estimates, any member of this Division bidding on any job amounting to two hundred and fifty dollars ($250.00) or more shall simultaneously

(Continued on page 74)

EDITORIALS

Help is Needed

IN the July issue an architect described the difficulty which his firm encountered when bids were asked for on a job of air conditioning a medium-sized residence. He got back a wide range of prices, ideas and equipment proposals. His experience certainly was not unique. This led him to prepare a specification in the form of a questionnaire which is published in this issue. Neither is this proposal unique, for printed forms of similar nature are in use. We are not prepared to state whether or not the proposed questionnaire will really act as a solution to the problem. At least it should be a help toward a clear understanding of what is wanted by the purchaser and what is offered by the seller. We believe that attempts to clarify the problem are well worth while.

It seems to us that the real reason behind such a spread of prices and such a variety of equipment lies in the simple fact that while it is possible to accomplish essentially the same results in a variety of ways, there is not yet a clear understanding of this on the part of purchasers. To most non-technical purchasers air conditioning is air conditioning. They have not yet learned how to discriminate nor do they have much in the way of experience to guide them. They are like purchasers of the early automobiles in this respect. In the case of automobiles, purchasers shortly developed into rather canny buyers and in general were quick to recognize a good car honestly priced and to turn thumbs down on the other kind. This result was not accomplished though without effort, and came about only when the buyers began really to understand what elements go to make up value in a motor car. It is quite likely that the purchase of air conditioning equipment for home use will go through the same evolution. In the meantime the purchaser needs help, and if we are wise all of us will try to see that he gets it.

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Let's Have More Facts About Real Property

MOST of the reports of the Real Property Inventory of last spring have now been made available in preliminary form. For the first time there are definite figures on the means of heating and the fuels used in residential buildings in a sizable number of localities. Information of this kind has been badly needed. The field work was accomplished quickly and the tabulations and publication of the results have been done with reasonable dispatch. It is a job well done.

The trouble with such surveys is that they only whet the appetite for more information of similar nature. What is needed now is like data on the buildings used for purposes other than residential in these same cities. With this at hand the building construction industry would have something to work on—a base on which to start its plans—such as it has never had before. In our opinion the present survey will prove so valuable that it is only a question of time until public or private means will be found to extend the scope to take in all buildings. The idea that a census should confine its efforts to population facts has been a hard one to overcome but seems to be gradually giving way.

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Can You Do Modernizing?

PAST modernizing work has established firmly the fact that the most necessary step is locating the prospect and that this must be done by different methods than for new construction. Active canvassing is required and this usually means direct canvassing to the building owner. At any rate the approach to modernizing work has to be aggressive rather than passive. Many firms used to doing new construction have found that a major adjustment is called for to get themselves lined up for modernizing. The anticipated public and private campaigns are not likely to do anything to change this condition. All they do aim to do is to put the owner and lender into such a frame of mind that they will be willing to consider modernizing. It will still be just as necessary as ever to go aggressively after the work. Now is a good time to really ask yourself if you are set up both physically and mentally to get modernizing work.

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Stoker Features

STOKERS intended especially for use in heating plants have been gradually developing for some years past until now they are well recognized as a separate type even though they still show the effects of their ancestry. The tables published in this issue give the principal mechanical features of a representative group of present-day models. Everyone will want to check up to be sure that his own ideas are up to date. If you have not followed the development of this equipment you are likely to find that these burners now include features which you had not realized. Their use has become general enough so you owe it to yourself and your clients to keep informed.

Abstracts . . .

Reviews and Summaries of. . . . Current Papers, Books and Pamphlets

Condensation of Moisture in Flues

With the increase in the use of gas for heating residences, the condensation of moisture in flues has become of special interest because of the possibility of damage to adjoining walls by seepage.

The amount of moisture condensed is determined by two main factors, amount of moisture in the flue gas, and temperature of the gases leaving the chimney. The amount of moisture deposited in the chimney will be equal to that in excess of the moisture required to saturate the gas at the exit temperature.

Since the moisture in flue gases originates from moisture in the fuel, from moisture in the air used for combustion, and from the combustion of hydrogen in the fuel, the amount of moisture in the flue gas can be calculated from the fuel analysis and the moisture content of the air for any given set of conditions.

The flue gas temperature will have to be determined experimentally and will vary with the type of installation, firing rates, and type of fuel. While the installation tested can be considered a typical modern residence and furnace, considerable variation may be expected.

The average flue gas temperatures at which condensation will take place are: anthracite, 68°; semi-bituminous, 84°; bituminous 93°; oil, 111°; natural gas, 127°; manufactured gas, 137°. The amounts of condensation per pound of fuel for various firing rates and for the various types of fuels are given in graph form.

[*"Condensation of Moisture in Flues," by W. R. Morgan. Published by Engineering Experiment Station, University of Illinois, Urbana, Ill.; Circular No. 22; paper bound; 6 in. × 9 in.; 22 pages; 9 graphs. Price 30c.*]

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Silicosis

This paper is to be recommended for the clear and well organized manner in which the subject of silicosis is discussed. A definition of this disease, which has plagued men working in dusty locations from ancient times, is given in the beginning of the paper. A good history of the disease is then given followed by a description of the symptoms and effects. Methods of determining the dustiness of the air are listed, as well as means of prevention.

[*"Silicosis," by R. R. Sayers, surgeon, U. S. Public Health Service. Published in Public Health Reports, Vol. 49, No. 20; May 18, 1934; 8 pages; approximately 3000 words. Obtainable from Superintendent of Documents, Washington, D. C.; price 5 cents.*]

Determination of Volatile Matter in Coal

Accurate determination of volatile matter in coke and coal is an important factor in many industries. As the results secured by the present methods of analysis are accurate within only 1%, this investigation was made to determine the proper time of heating, an important factor in the analysis. The proper time periods for the determinations was found to be two 7-min. intermittent periods of heating. The reported percentage is then obtained by subtracting the loss during the second 7 min. from the loss during the first 7 min. All of the cokes and coals except bituminous (over 25% volatile matter) should be heated as above. Bituminous coals should be heated for 4 min. with the other conditions remaining the same.

[*"The Time Factor in the Determination of Volatile Matter in Coke and Coal," by F. W. Schwartz and J. L. Rosenholtz, Rensselaer Polytechnic Institute Bulletin, Engineering and Science Series, No. 47; paper-bound; 9 pages; 5¾ in. × 7¾ in.*]

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Operators' Manual on Feed Water Treatment

Knowledge of the correct treatment of boiler feed waters will yield large returns in reducing excessive maintenance and operating costs in boiler rooms. This is especially true in small isolated plants which do not employ the services of an experienced boiler water chemist. In spite of the large amount of literature available on the subject, many operating men have only a slight understanding of the subject. This is not the fault of these men but is due mainly to the fact that most of the papers dealing with the subject are written in a highly technical manner and from the viewpoint of engineers having a good training in chemistry.

To help the operating man, the authors have prepared the manual from his point of view. Each division of the subject is dealt with separately, with the thought of presenting as much definite data as is practical on that particular division. Where it is possible, concise and definite instructions are given.

Methods of sampling water and making tests, together with descriptions of the apparatus used, are given in the first portion of the book. The next section is devoted to instructions for interpreting the results of tests.

A complete description of the various methods of treating water occupies the major portion of the book. Simplified explanations of the more complicated treatments, together with the advantages and disadvantages of each method, are also included in this section.

The last five chapters of the book are made up of miscellaneous information and data. Some of the titles are corrosion, water softening chemical equations, chemical equivalent weights, and miscellaneous notes.

[*"Boiler Feed and Boiler Water Softening," by H. K. Blanning and A. D. Rich; published by Nickerson & Collins Co., Chicago; 156 pages; 8½ in. × 11 in.; flexible cloth binding. Price $3, postpaid.*]

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Drawings and Drafting Room Practice

American Standards Association has published a tentative draft of the proposed American Standard on Drawings and Drafting Room Practice, including sizes, arrangement of views, line work, dimensioning, and lettering.

Although the standards cover the whole field of mechanical drawing, with little of specific relation to mechanical equipment of buildings, nevertheless, the information on arrangement of views, dimensioning, and lettering particularly will affect the heating and ventilating draftsman. The Standards, while not yet available for general distribution, are available for criticism and review.

[*Proposed American Standard Drawings and Drafting Practice; ASA draft standard Z 14; standard size; 24 pages; illustrated; available only on loan.*]

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A.S.H.V.E. Transactions for 1931 and 1932

The 1931 and 1932 Transactions of the A.S.H.V.E. have been published and have been distributed to members. These two volumes contain many important papers, all of which have been either abstracted or published in full by HEATING AND VENTILATING. A few of the subjects covered are the Insulating Effect of Bright Metallic Surfaces, Code for Testing Steam Heating Boilers, Heat and Moisture Losses for Men at Work, Heat Transmission as Influenced by Heat Capacity and Solar Radiation, and Carbon Monoxide in Garages.

[*"Transactions of American Society of Heating and Ventilating Engineers," published by the Society at the Office of the Secretary, New York; volumes 37 and 38, 1931 and 1932.*]

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An Economic Study of Heat Loss of Buildings

While technical data on insulation and heat loss are plentiful, there is a definite lack of information on the economic aspects of this important subject. This paper was written in order to fill this need and will be useful to those interested in conserving fuel and reducing costs.

A discussion of losses and conservation of heat is given in the opening section of the paper. There are two classes of losses, those which can be reduced and those which, for one reason or another, cannot be decreased. The first class consists of the losses due to heat conduction and radiation and they may be reduced as far as savings permit. The second class consists mainly of those due to air changes and cannot be decreased due to the necessity of providing an adequate air supply for the occupants.

The more important methods of conserving heat are as follows: reduction of inside temperature; insulation; weatherstripping and caulking, and double windows.

The savings and returns on investments will depend upon whether the methods of heat conservation are planned before the building is built or made after. In the former case the savings and returns will be greater because it will be possible to install a smaller boiler and less radiator surface.

In order to discuss and evaluate the practical results obtained, the author uses a typical house as an illustration. The building has a capacity of 12,960 cu. ft., is uninsulated, has no weatherstripping, and has a frame structure with a slate roof. It has a hot water heating system with a plain thermostat.

Summary of Possible Heat Savings, Typical House

	First Cost Given Dollars	Savings B.t.u.		Saving Per Cent of Total		Saving in Heating Plant Cost Dollars	Net First Cost Dollars	Gross Annual Saving Operating Cost	Annual Depreciation Operating Expense Dollars	Annual Operating Saving Dollars	Return on Net Investment Per Cent	In House Already Built with No Saving in Heating Plant	
		Maximum Hour	Per Degree Per Day	Maximum Hour	Per Degree Per Day							First Cost Dollars	Return on Gross Cost Per Cent
Clock on thermostat	20.00				7.5		20.00	16.03	2.40	13.63	68.	20.00	68.
Weatherstripping	100.00	12740	672	11.8	1.6	69.00	31.00	4.40	0.00	4.40	14.	120.00	3.7
Double windows and storm doors	100.00	25305	4993	23.6	12.1	121.00	21.00	35.25	13.00	22.25		120.00	18.5
Insulation in walls No. 1	196.00	22540	7728	21.	18.9	107.00	89.00	51.14	0.00	51.14	57.	289.00	19.6
Insulation in walls No. 2	260.00	12810	4490	12.	14.0	61.00	199.00	30.00	0.00	30.00	15.		
Insulation in roof No. 1	66.00	10584	3629	10.6	11.2	51.00	15.00	24.00	0.00	24.00	36.6	115.00	20.9
Insulation in roof No. 2	115.00	6050	2073	5.6	6.4	30.00	85.00	14.00	0.00	14.00	16.5		

Insulation No. 1—4-inch rock wool—cost if placed when house is built 12 cents per sq. ft. Cost if blown in later 16 cents per sq. ft.
Conductance .27 B.t.u. per sq. ft. per degree per inch.
Insulation No. 2—A board insulation one inch thick, used as plaster base costing 16 cents per sq. ft.
Conductance .34 B.t.u. per sq. ft. per degree per inch.

A summary of possible heat savings is given in the table. For a clock-type thermostat, there is a 7.3% saving in fuel and after allowing for maintenance and depreciation of the clock, the return on investment is 68%. The fuel saving is due not only to maintaining a lower temperature for 6 to 8 hr. but also to the fact that when the windows are open in the bedrooms, a great deal of heat is lost if the day setting of the thermostat is maintained.

If weatherstripping is planned upon when the house is built and the heating plant is reduced accordingly, the saving in cost of the heating plant should pay for two-thirds of the weatherstripping and the return on the net investment will be 14%. If installation is made after the house is built, the total heat loss saving will be 11.8%, but on the basis of the season's requirements the savings will be only 2% of the total fuel.

The table shows that double windows and doors are one of the most important and efficient methods of heat conservation. If they are installed when the house is built, the savings on the capacity of the heating plant is nearly 25% and 12% on fuel. The return is 22% of the net cost and 18.5% of the gross cost if installation is made after the house is built.

As the subject of insulation is a very broad one, the report limits the discussion to the more practical and usual applications met with. The figures obtained emphasize the fact that insulation is doubly valuable

(Continued on page 72)

NEWS OF THE MONTH

Concealed Radiators Being Tested and Rated

NEW YORK—Concealed radiators of all makes are being tested and rated in the Frost Research Laboratory at Norristown, Pa., in accordance with the NRA code for the concealed radiator industry. The code provides that after September 1, 1934, all ratings of such radiators shall be in accordance with the A.S.H.V.E. Code for Testing of Concealed Radiators. Consequently, the code authority of the concealed radiator industry has ruled that all manufacturers send their radiators to the Frost Laboratory for testing where the rating will be determined for two lengths of radiators of each width and one height.

It was physically impossible to have every length, width, and height of radiator manufactured by all manufacturers tested prior to September 1. Such a procedure would be extremely expensive and so tests have been confined to two lengths and one height for each core width.

The members of the industry feel that this move of having a common yardstick which is used by all members is an advance which could be accomplished only by a mandatory code which requires this feature.

Furnace Code Authority Approved

WASHINGTON — Recognition of the personnel of the Code Authority for the Warm Air Furnace Manufacturing Industry was given by NRA Administrator Hugh S. Johnson Ju'y 5.

The members of the Code Authority are: F. E. Mehrings, Meyer Furnace Co., Peoria, Ill.; W. G. Wise, Wise Furnace Co., Akron, Ohio, and James J. Lally, Hart and Crouse Co., Inc., Utica, N. Y.

The budget for the Code Authority for the Warm Air Industry, approved June 30, calls for $27,507.33 for the 13 months beginning December 1, 1933. Members of the industry will contribute on the basis of furnace sales for 1933, at the rate of two-fifths of 1%.

American Radiator Forms New Company

NEW YORK—A new company, Standard Air Conditioning Inc., has been formed by the American Radiator & Standard Sanitary Corporation to take over the specialized air conditioning activities formerly conducted as a phase of the work of one of the corporation's subsidiaries, Campbell Metal Window Corporation.

Individual room units for use with radiator heating systems, formerly marketed by the Campbell Corporation, are now being sold by the new company, and other equipment for use with radiator heat will be developed, with the room units serving as a nucleus from which the line can be built.

Fowler Manning, who was appointed last winter to serve as a coordinator in the air conditioning activities of the American Radiator & Standard Sanitary Corporation, is the president of the new company, and E. V. Walsh is sales manager.

The company will begin immediately to market equipment through heating contractor-dealers in the New York area, and arrangements are being made to extend the scope of the company's work to a national scale, by the use of heating contractors as dealers.

Headquarters of the company will be at 40 West 40th St., New York.

AIR CONDITIONING

To him who lingers twenty years
New comforts will be known,
The air conditioned motor car
And air conditioned home.

His life will be much sweeter then,
And with the world he'll laugh,
As from his bed he'll hurry to
An air conditioned bath.

No dust will enter where he lives
With deadly germ and spore
But air conditioned air he'll breathe
And live another score.

He'll suffer not in sweltering heat
Nor at the cold complain
But to his work he'll travel on
An air conditioned train.

And when the summer season comes
With its vacation trip
He'll see the South Sea Islands on
An air conditioned ship.

Then when that grim old Reaper calls
You will not hear him rave
But smile and ask the Sexton for
An air conditioned grave.

And when he meets Saint Peter
At the elevator door,
He'll ask for life eternal on
An air conditioned floor.

William H. Black,
Oakland, Calif.

Henderson V. P. of Refrigerating Group

YORK—William B. Henderson, secretary of the Code Authority and Washington representative of the Machinery and Allied Products Institute, has been made executive vice-president of the Refrigerating Machinery Association, according to the head of the association, W. S. Shipley, president of the York Ice Machinery Corporation. Mr. Henderson assumed his new duties August 1, with offices of the association moved to Washington from Philadelphia.

Walker and Phillips Talk to Gas Men

NEW LONDON, CONN.—Sales problems connected with gas house-heating and air conditioning were discussed at the annual New York-New England Regional Gas Sales Conference, held at the Hotel Griswold, Eastern Point, June 28-30.

W. S. Walker, Consolidated Gas Company of New York, spoke on "Domestic Heating and Air Conditioning," and C. B. Phillips, vice-president of the Surface Combustion Corporation, discussed "Meeting Today's Industrial Competition."

Vancouver's District Heating Under Way

VANCOUVER, B. C.—The City Council has approved an agreement granting a franchise for a district heating plant for congested areas to a group of Vancouver business men and H. A. Flood, Tacoma, Wash.

Preliminary work on the heating plant is now under way, with Col. E. J. Ryan in charge. The first unit is estimated to cost in the neighborhood of $250,000.

Stamford Utility Air Conditions

STAMFORD, CONN.—The Stamford Gas & Electric Company has installed an air conditioned room on the main floor of its office building at Atlantic and Federal Streets. The room, which adjoins the company's appliance showroom, will be used to demonstrate Westinghouse Mobilaire cooling equipment. Extensive newspaper advertising is being used to announce the exhibit.

J. W. Clark is new-business manager of the company, with general supervision of sales.

Fuel Competition Gets More Intense; Hearing on Oil Price Rise Held in Washington; Burner Men Protest the Increase

Seventy-five years ago this month Edwin Drake drilled and found oil in Titusville. Pa. What he foresaw was cheap, convenient light. What he did not anticipate were the 25,000,000 automobiles, half million hot dog stands, and nearly a million oil-heated homes.

While thousands of oil men joyously prepare for a diamond jubilee in the western Pennsylvania town, distributors and consumers of their fuel are angrily attacking the price advances which have seriously affected the cost of heating buildings, cooking the hot dogs, and heat-treating the auto-parts. The coal and gas industries alternate between complacency and aggressively attempting to displace the oil.

Coal and gas men saw to it that the recent change-over from oil to coal by New York's Equitable Building was much, and perhaps over-publicized. Over, because fuel shifts are made every day, and the shift from oil to coal has not become a trend, is of little more significance than a Spokane hotel's use of sawdust for fuel.

Oil price advances in July were up over June but not sharply so. Nevertheless, charges, counter-charges, complaints, and irritation multiplied rapidly, culminating in a public hearing July 30, called by Secretary Ickes before the Petroleum Administrative Board.

On that day Chairman Nathan R. Margold listened patiently to evidence presented by complainants who included Miss R. W. Ayres of Consumers' Advisory Board (NRA) and Lieut. C. H. Ritt of the Navy, both of whom want lower prices. Independent oil distributors attacked the producers. W. H. Gottlieb, spokesman for Washington oil burner men, told of formidable sales resistance to oil burners. A. W. Willett, statistician for the National Coal Association, warned the Board that low fuel oil prices played havoc with the coal industry, encouraged unemployment, urged that the oil code should require no oil product to be sold under cost of production[1]. (Such a restriction appears in the coal code.)

At 3 p.m. no defenders for the petroleum industry had appeared. Chairman Margold adjourned the meeting. His Board will meet, examine the evidence, and recommend action by Secretary Ickes.

What the Board will suggest is problematical. The question is difficult, complicated by unusual angles. Those familiar with the situation point out that several forces are tending to disturb the price situation.

Principal among these in alarming home owners (but otherwise of no great importance) is the top price contract provision in the oil code[2]. The fuel oil dealer in his contract guarantees that the buyer will not have to pay more than 25% (recently changed to one cent) over the market price at the time of signing the contract.

Typical among consumer complaints on this rule: "I am a user of fuel oil for heating apartments. The contract price last year for No. 3 oil was 5 cents per gallon. I am now informed that the coming winter will cost me 7 cents with a possible price of 8¾ cents."

The Philadelphia citizen who wrote this letter was concerned with the increase from 5 to 7 cents, worried over a possible rise to 8¾ cents. The latter is doubtful; the former is a fact. What has caused the increase to 7 cents?

The big oil producers blame several causes[3] and list them as:

(1) The Government requested (and obtained) a promise from importers to bring in not more than 35 million barrels per year, thus shutting off the supply from South America;

(2) An import duty of 21 cents on each barrel of crude and fuel oil allowed;

(3) Increase in consumption of fuel oil, the result of more oil burners being in operation[4], and also the severe winter in the east.[5]

Independent oil producers claim otherwise—charge that price raise is due to desire of trusts to put them out of business. Engineers guess that part of rise at least is due to drop in percentage of crude going into fuel oil[6].

Not to be ignored, however, are the general policies formulated by President Roosevelt and Secretary Ickes. When the NRA code for the petroleum industry went into action, production of crude oil was sharply reduced. Result, increases in prices of crude oil and its derivatives.

Purposes of limiting production were several:

1—To increase the price and force the price level, in general, up.

2—By increasing the price to make it more profitable for low grade oils to be marketed, thus put more men to work.

3—To conserve our petroleum resources.

To many of these and other arguments, Chairman Margold and his coworkers must give consideration. Among the others is that of Miss Ayres: Even conceding all reasons for price rises, why should relative prices of fuel oil and crude have changed? During the fall of 1930, Dr. Ayres claims, crude petroleum sold for $1 per barrel, while the refinery price for fuel oil was 61 cents. Crude is now again selling for $1, but fuel oil is up to 75 cents. Present gasoline prices are 100% higher than the all-time depression low in 1933, while fuel oil is 127% higher than its all-time low.

Oil burner men are among the most vociferous of the complainants. A.O.B.A. directors, meeting in Chicago July 10, resolved to make an organized protest against the import and tariff restrictions. Plan: President Roosevelt has the power to reduce tariffs at least 50%. Oil burner owners, makers, dealers, and employes are being urged to request him to take such action. Failing in this, Congress when it meets will be asked entirely to eliminate the tariff.

Meanwhile coal men are making the most of their advantage. Two coal companies in New York refused to abide by the prices set by their Code Authority. One claims to have doubled its business. Anthracite producers, pleased with the oil burner's plight, are enthusiastic about another development, the stoker-boiler unit, which they hope will compete on better than even terms with boiler-burner units.

Nor are gas utilities sitting idly by. Equitable Gas Company of Pittsburgh on July 16 startled oil and coal interests by opening a big campaign on gas conversions. Big gun of the drive is the $2 monthly rental plan.

Last month Baltimore Gas & Electric Company agreed to oil burner men's request that it discontinue its newspaper advertising on "free service," refused to change its policy of selling conversions for $155, payable $4 monthly.

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[1] An amusing paradox—a coal representative defending the oil producers' position. Logical, in this case, for production cost plus would further jump fuel oil prices, decrease coal's trouble with oil competition.

[2] Inserted by the Planning and Coordination Committee May 16, this year, and modified and amended half a dozen times.

[3] Standard Oil's marketing expert R. G. Stewart explained these reasons to the press July 14. Meanwhile H. H. Rogers, S. O. capitalist, had removed an oil burner from his estate, installed a stoker.

[4] Domestic burners sold in 1933: 71,626. This increased the number in operation about 9%.

[5] Last winter, measured by degree-days for New York, Boston, Philadelphia, and Baltimore, was 20% colder than last. Western winters, though, were warmer. This, together with increase in burners in use jumped 1934 domestic consumption an estimated 10%.

[6] Fuel oil is made by the hydrogenation process and the topping process. The latter, the more common, is such that fuel oil is a by-product in the refining of gasoline. Due to the increased cracking of fuel oil into gasoline the percentage of crude oil which goes into fuel oil has decreased from 38% in 1929 to 32½% in 1933. This is considered desirable by the refiners inasmuch as there is a very much higher price paid for gasoline than for fuel oil.

June Heating Business Off Sharply

NEW YORK—Although June general business shows only a slight decline from May the heating business, as reflected by HEATING AND VENTILATING'S Index of Heating Business, dropped steadily from 47.4 in April to 45.5 in May and to 40.9 in June. The figures are adjusted for seasonal variation and are in per cent of 1929 business.

The decline in the May figures over those in April were due to decline in the heating business in general. The June drop, however, was caused almost entirely by a sharp drop in oil burner sales, which fell to 4804 in June from 7091 in May. Apparently the drop was due to fear on the part of consumers of further increases in oil prices. Boiler-burner unit sales, however, showed an increase from 495 units in May to 707 units in June.

Although there is ordinarily a small seasonal increase in total building from May to June, this year there was a drop from $77.6 million to $69.7 million. Non-residential building fell from $52.8 million in May to $43.1 million in June. Residential building rose from $24.8 million in May to $26.6 million in June.

Little or no variation took place in heating equipment prices and in building construction costs.

Employment in plants manufacturing heating equipment increased from 52.1 in May to 53.6 in June. The figures are in per cent of the employment in 1929, and are not adjusted for seasonal variation.

Carrier Shows Increase

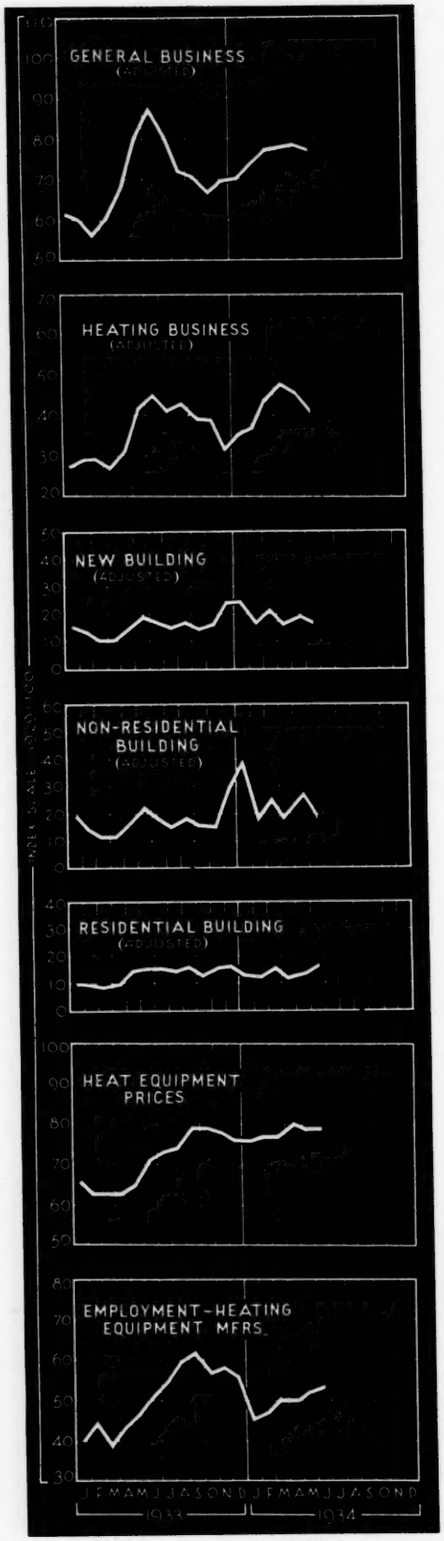
NEWARK—Carrier Corporation reports an increase of 98% in sales for the six months ending June 30, compared to total sales for the same period of 1933. Accepted contracts for air conditioning installations in this period amounted to $3,463,000 compared to $1,746,000 for the first half of 1933. The corporation carried over into the second half of the year $1,935,000 of uncompleted contracts, an increase of $673,000, and the first time in four years that unfilled orders for the first six months have shown an increase.

A.C. for Denver Furriers

DENVER — Dupler's and Neusteter's, two of Denver's furriers, have installed air conditioning to solve a perplexing sales problem in recent weeks. The opening of the regular summer sale of fall and winter furs found the city sweltering in the worst heat spell for many years, with temperatures averaging 6° above normal.

Both firms report marked increase of business.

Business Trends



Above charts marked "adjusted" are those in which corrections have been made for seasonal variation. The second chart is that of HEATING AND VENTILATING'S Index of Heating Business Activity. New building figures are from F. W. Dodge Corp. The general business index is based on the "New York Times" weekly index. Indexes of employment and prices are based on data of the Bureau of Labor Statistics, U. S. Dept of Labor.

Furnace Code Amended; Register Code Approved

WASHINGTON—A number of amendments to the NRA code for the warm-air furnace manufacturing industry were approved June 27. Among the amendments included is one making it an unfair trade practice to publish firepot measurements which do not represent the true inside diameter of the firepot at the top unless the manufacturer chooses to publish a measurement taken at some other point, in which event the exact point shall be designated.

It is also an unfair trade practice to publish any rating in terms of square inches of warm air leader pipe unless such a rating has been computed according to the standard code, or unless the manufacturer specifically states that such a rating is not a standard code rating.

The NRA code for the warm-air register industry was approved June 28.

Denver Contractors Study A. C.

DENVER — A committee has been named by the Heating and Piping Contractors Denver Association to make a thorough study of air conditioning problems in this region and the methods being used to cope with them. The committee will investigate every air conditioning device on the local market and attempt to evaluate each in the light of efficiency, cost of operation, ease of installation, possibilities of adaptation to low humidity conditions, etc. The report of the committee probably will be ready in the early fall.

According to Joseph E. McNevin, secretary of the association, appointment of the committee culminates a growing feeling among the members that air conditioning must soon become an integral part of their service. The study is expected to provide a basis upon which the engineers may give reliable advice to customers.

New A.C. Jobs for Boston

BOSTON, MASS.—Three recent air conditioning installations in this section are attracting favorable attention.

A Perfectaire conditioning system has been installed by the Air Conditioning Engineering Co., Cambridge, in Slade's Restaurant.

Curtis & Brock, Inc., 115 Newbury Street, dealer in G. & B. conditioned air systems, has installed an air conditioning system in the English Hunt Room of the Hotel Victoria.

M. Bowman Judkins, builder, plans to erect 24 homes in Lexington, embodying Gar Wood air conditioning.

Chrysler Enters Air Conditioning Field with Room Coolers; Complete Line Planned

NEW YORK—Chrysler Corporation has entered the air conditioning field with a line of room coolers manufactured by the Amplex Division of Chrysler Motors. Formal announcement was made July 16. The products will be distributed through the Temperature Corporation, of which Walter P. Chrysler, Jr., is president, and Byron C. Foy, president of De Soto Motors, is vice-president. Louis T. M. Ralston, well known in the heating industry, is in charge of engineering and installation. H. C. Jamerson is general sales manager. Directors are Mr. Chrysler, Jr., Mr. Foy, P. F. Tierney, Harry Davis, Jack Chrysler, and Edgar Garbisch. The last is a son-in-law of Walter Chrysler's and a former All-American football player at West Point.

Equipment now available for distribution includes a line of room cabinets available in 12 finishes and with cooling capacities of from 1 to 2 tons, equipped for humidifying, cooling, and heating. The compressor is remotely located. The units sell for $175 and up, list price.

Plans for the future include a line of similar cabinets for overhead suspension and three sizes, with capacities from ¾ to 1¼ tons, of the self-contained type. There is also a line of condensing units with capacities up to 25 tons of refrigeration which will be on the market in the next few months. It is planned to have a complete line of house-heating and cooling units on the market by the first of 1935.

Distribution will probably be through franchised dealers. The United Air Conditioning Sales Corporation has been appointed distributor for the metropolitan New York territory.

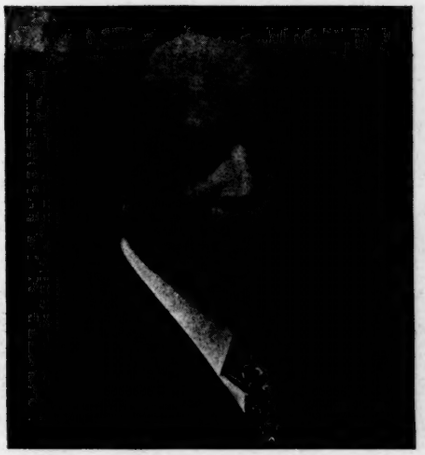
L. T. M. Ralston, in charge of engineering, Temperature Corporation.

Mr. Chrysler, Jr., who is 26 years old, attended Dartmouth College. He has been chairman of the operating committee and a member of the board of directors of the Chrysler Building Corporation. In addition to acting as president of the Temperature Corporation he is also chairman of the board.

Mr. Ralston, formerly a consulting engineer, designed the mechanical equipment for the Chrysler Building, completed about five years ago. Since that time he has been connected with Chelva Heat, Inc., manufacturers of electric radiators, as vice-president, and with other ventures. He has been active in A.S.H.V.E. circles and was at one time president of the New York Chapter.

Mr. Jamerson was formerly advertising manager of De Soto Motor Corporation and one time assistant sales manager of Frigidaire Corporation.

The Amplex Division is a Chrysler affiliate which manufactures the gasoline motors for Chrysler, and also manufactures a line of gas engines.



(Above) H. C. Jamerson, general sales manager.

(Left) Walter P. Chrysler, Jr., and Temperature Corporation's cooler.

Central Plant for City Buildings

NEW YORK—With an annual saving of $35,000 in view, the Works Division of the Department of Public Welfare is rushing work on the new central heating plant for four Brooklyn civic buildings.

Four hundred men are working in two shifts to complete the new system, which will replace the present heating arrangements with an oil-burning central plant in the Municipal Building. Pipes under ground will supply the Municipal Building, Supreme Court, Hall of Records, and Borough Hall with vacuum heat.

At present these buildings are heated by individual plants, burning coal. The new system, which will cost $62,500, is expected to save $15,000 annually in fuel and $20,000 in maintenance cost.

Vassar V. P. of A. S. T. M.

NEWARK, N. J.—Hervey S. Vassar, laboratory engineer in charge of the Public Service Electric and Gas Company's testing laboratory at Irvington, was elected vice-president of the American Society for Testing Materials at the annual meeting of the society in Atlantic City recently. Mr. Vassar has been a member of the society for 19 years.

Thomsen Opens Office

GREENWICH, CONN.—Oscar Thomsen, Sr., heating consultant and designer-patentee of the Foran boiler oil-heating unit made by the Foran Boiler Co., Flemington, N. J., has opened offices at 109 Greenwich Avenue here. He will install and service oil-burning equipment and offer counsel on heating problems.

Electrol Appoints Distributor

HARTFORD—The Capitol Plumbers' Supply Company, with offices and warehouse at 151 Walnut Street, has been appointed distributor of the Electrol-Kewanee boiler-burner unit and Electrol conversion oil burners, and will appoint dealers throughout the Hartford territory, according to Fred J. Murphy, manager.

Lewis Licenses Two Control Makers

MINNEAPOLIS—Lewis Air Conditioners, Inc., of this city, has licensed Julien P. Friez and Sons, Inc., Baltimore, and the Minneapolis-Honeywell Regulator Co., Minneapolis, under Patent No. 1,785,741, entitled, "Air Conditioning Systems." The Detroit Lubricator Co., Detroit, has previously been licensed under this same patent.

E. F.-M. and Arco Introduce Boiler Stoker at Convention

NEW YORK—The feature of the seventh annual sales convention of Electric Furnace-Man, Inc., was an announcement of more than ordinary significance, that of an anthracite-burning stoker-boiler unit placed on the market by E.F.-M. in cooperation with the American Radiator Company. Considerable enthusiasm was displayed by the company's dealers, who saw in the white enameled combination equipment which would enable them better to compete with modern oil units.

About 275 dealers and guests attended the meeting, which was held July 16 in the Hotel McAlpin.

Oscar F. Ostby, vice-president of the company, opened the convention with an address, "We Have a Real Opportunity—Let's Take Advantage of It." Mr. Ostby stressed the fact that this is the first residential type boiler-stoker unit designed particularly for anthracite, available through any large boiler manufacturer. He was followed by William R. Zuhlke, American Radiator engineer, who described the new boiler-stoker unit and told of tests which had been conducted on it.

Other speakers and their subjects included "Controls," by Arnold Michelson, vice-president, Minneapolis-Honeywell Regulator Company; "Proper Blocking and Baffling," by Fred Hilder, engineer, Electric Furnace-Man, Inc.; "Domestic Hot Water Supply," by Joseph Murphy, vice-president, Taco Heaters, Inc.; "The Problem of the Junior Sizes of Anthracite," F. W. Saward, publisher and editor, *Saward's Journal;* "The Dealer's Side," by Elmer Martin, sales manager, Robert Howarth's Sons, Inc., Chester, Pa.; "Selling," by Charles E. Redfield, American Radiator Company.

The annual banquet was held in the Grand Ball Room in the evening.

Gold Mine in Africa to be Conditioned

NEWARK, N. J.—The first step in a program to air condition the mines of the famous South African gold fields, a development which by increasing the productivity of the mines may ultimately result in profound changes in world economic conditions, is the award of a contract to Carrier-Brunswick International, Inc., for the air conditioning of Robinson Deep Mine, near Johannesburg, one of the deepest mines in the world.

The air conditioning installation to be completed under this contract will be the largest on record. It has been designed to supply 400,000 c.f.m. to the mine workings which penetrate 8,000 ft. below the earth's surface. Refrigeration equipment rated at 2,000 tons will be a feature of the South African installation which involves a total expenditure of approximately half a million dollars.

Economic significance of the project lies in the increased production of gold which engineers claim will result from extending the depth of present operations. Rich veins of new ore are known to exist in levels that it is now impossible to work, owing to the unbearably high temperatures and humidities. At the bottom of the Robinson Deep Mine, temperatures of more than 100 degrees Fahrenheit, with extremely high humidity, sometimes approaching saturation, are experienced.

Adams Joins Fluid Heat

BALTIMORE—Earl E. Adams has joined Fluid Heat as manager of installation and service. Mr. Adams was for 15 years chief engineer with the Gas Research Co., Dayton, Ohio, where he was in charge of research and installation of gas manufacturing and oil-burning equipment.

Bachman on Cincinnati Code Committee

CINCINNATI—A. Bachman, formerly executive secretary of the Heating and Piping Contractors Association of Greater Cincinnati, has been made Code Administrator of the Cincinnati Administrative Committee with offices at 716-18 Building Industries Exhibit Building.

N. Y. Night Course in A. C.

NEW YORK—A new evening course in air conditioning at the New York Y.M.C.-A. Schools at 5 West 63rd St., is planned to start September 18. Meetings will be held two nights a week, on Tuesdays and Fridays, from 7.30 to 10 p.m. The course will run for five months. Instruction will be largely through lectures by guest speakers invited for the occasion. Arrangements have also been made for field trips to various classes of buildings in New York which have air conditioning systems in operation.

Air Washer Firm Organized

DENVER — A new firm, the Spray Wheel Air Conditioners Company, has been incorporated here to manufacture and deal in all kinds of air conditioning, heating, and ventilating equipment. The principal business will consist of the manufacture and sale of a new air washer, humidifier, and cooler embodying patents covering a wheel-in-a-trough spraying device.

The product is the result of research and experiment by the engineering firm of Harry H. Herman. There are 15 installations in Denver using this principle.

Emmett Reitler, Ernest W. Kugler, and Lowell D. Hunt are the incorporators. The company is capitalized at $10,000.

Electric Furnace-Man dealers at the sales convention, July 16

Oil Burner Men Revive Oil Heating Institute; Discuss Code

CHICAGO—Recognizing the need for united action among members of the oil burner industry, the Executive Committee of the American Oil Burner Association called a conference of oil burner manufacturers at the Medinah Michigan Avenue Club, Chicago, July 9. The conference was conducted jointly by R. M. Sherman and E. P. Bailey.

Morgan J. Hammers, chairman of the Oil Burner Code Authority, reported briefly on the Code situation by reviewing developments from the May 8 hearing in Washington. including the informal conference of members of the industry held in New York June 29.

In discussing the June 29 conference, Mr. Hammers reported that a special industry committee under the chairmanship of E. A. Halbleib had been appointed for the purpose of making recommendations as to the scope and extent of future Code activities and to suggest modifications or amendments to the present Code. Mr. Hammers invited all then present to send any comments or suggestions with reference to the Code to Mr. Halbleib and in closing said, that, "in his opinion it was incumbent upon all members of the industry to cooperate within the limits of reason to obtain such code provisions as are feasible for the industry."

In discussing the situation with respect to present fuel oil prices by reason of top price contract regulations under the Petroleum Code and the effect of these regulations on the sale of oil burning equipment, a motion was made and passed to reorganize the Oil Heating Institute program to carry out the original purposes of that organization.

The remainder of the conference was devoted to an extended discussion of gas competition and other industry problems, including the model ordinance recently adopted by the National Board of Fire Underwriters and the National Fire Protection Association, the New York City fuel oil rules and the Commercial Standard Fuel Oil Specifications.

The board of directors of the Association held its regular quarterly meeting the following day, July 10. The meeting was unique in that as the result of an invitation extended by President Sherman, it was attended by representatives of manufacturers and dealers not represented on the board of directors, including manufacturers who are not members of the Association.

There was an extended discussion of a report made by the committee appointed at the industry conference on July 9. The report, in part, follows:

The manufacturers' conference on July 9, 1934, unanimously voted that a special committee submit to the board of directors of the A.O.B.A. recommendations for the reorganization of the Oil Heating Institute to carry out original purpose of that organization.

We therefore recommend that:

A permanent committee immediately be appointed by the board of directors of the A.O.B.A. from members of industry irrespective of Association membership to reorganize the Oil Heating Institute as recommended by the manufacturers' conference.

That the board of directors of the A.O.B.A. authorize said committee to utilize facilities of A.O.B.A. until such times as funds are available.

That the committee be instructed to promote a closer cooperative spirit with the petroleum industry.

The following motion was carried after a discussion: "That the report of the special committee appointed by the manufacturers' conference be adopted and that the President appoint a committee to carry out its provisions."

President Sherman appointed the following Special Oil Heating Institute Committee: A. J. Fleischmann, chairman; R. S. Bohn, F. H. Dewey, J. J. Donovan, S. C. Hope.

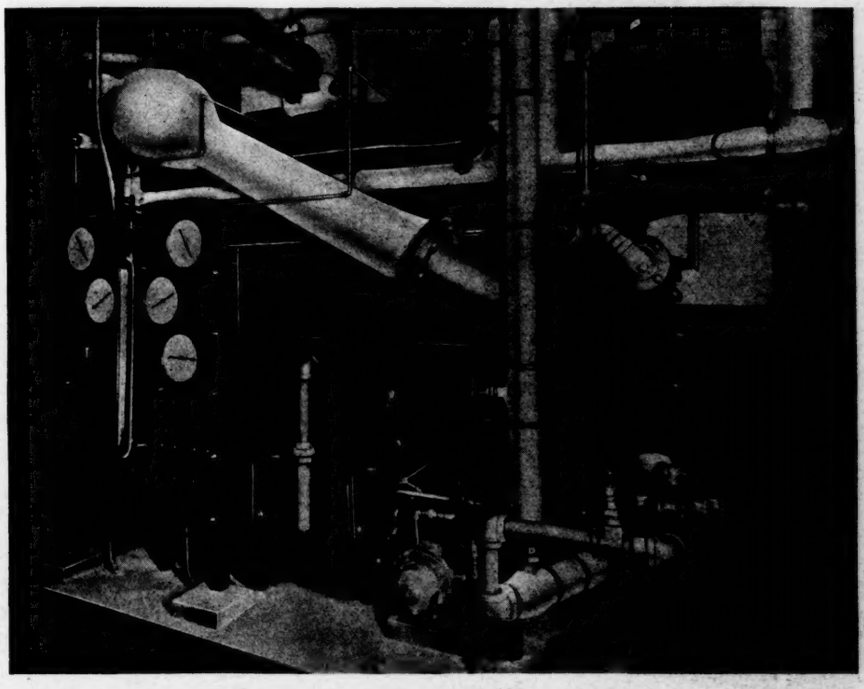
A report of the President's Special Committee was presented to the Board and during the discussion it was decided to appoint a Special Dealer Division Policy Committee for the purpose of recommending a reorganization of the activities of the Dealer Division. This committee was appointed as follows: R. S. Bohn, chairman; F. H. Dewey, A. J. Fleischmann, C. J. Bassler, A. G. Baerenklau, W. F. Schroeder, and J. W. Scott.

The board of directors accepted with regret the resignations of Morgan J. Hammers and W. S. Salway as members of the board and executive committee and the resignations of John H. McIlvaine and John Blake, Jr., as members of the board. Following this action A. J. Fleischmann and M. A. Powers were elected members of the executive committee and J. H. O'Brien of the Petroleum Heat & Power Co., Ray Whipple of Harvey-Whipple Inc., and John Berghoff, Wayne Oil Burner Co., were elected to membership on the board.

After a short discussion of the Code situation a Special Committee was appointed to make recommendation and report to the president of the Association within one month. The committee consisted of W. F. Brennan, chairman, A. G. Baerenklau, and J. J. Donovan.

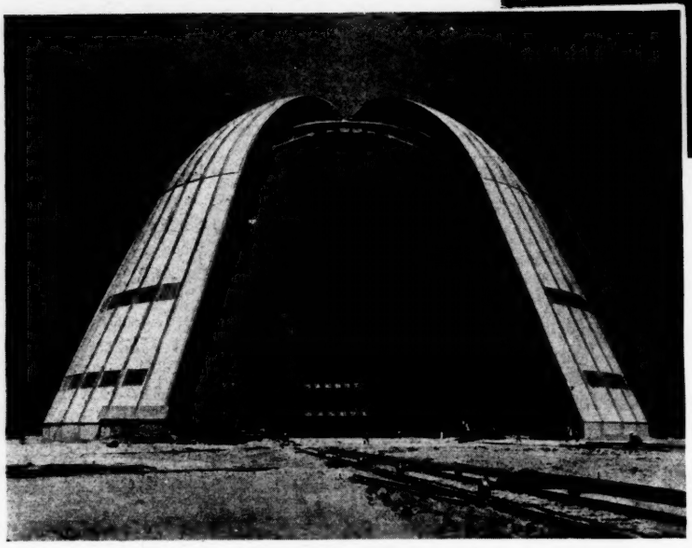
Dail Appointment

CHICAGO—Malvin & May, Inc., have been appointed sales engineers and representatives for Dailaire Systems in Northern Illinois, part of Iowa, Indiana and Wisconsin.



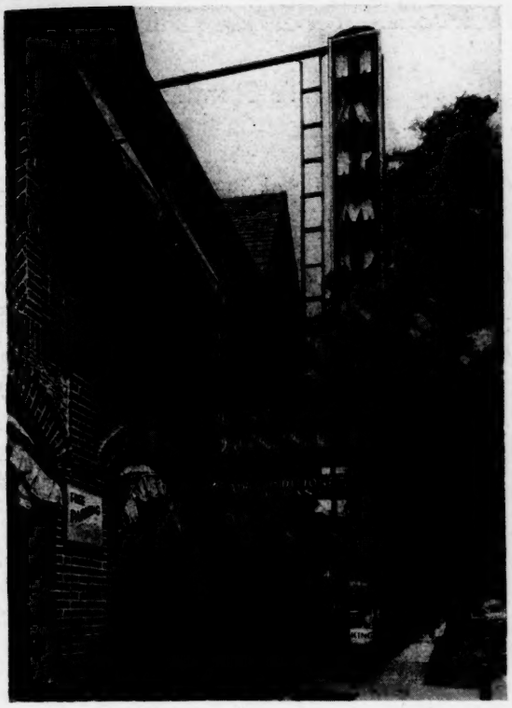
A 20-ton Worthington steam jet refrigeration unit in a large New York club. It is designed to cool 48 g.p.m. of water from 55° to 45° using steam at 90 lb. gauge pressure, and city water at 70° for condensing.

Picture Paragraphs



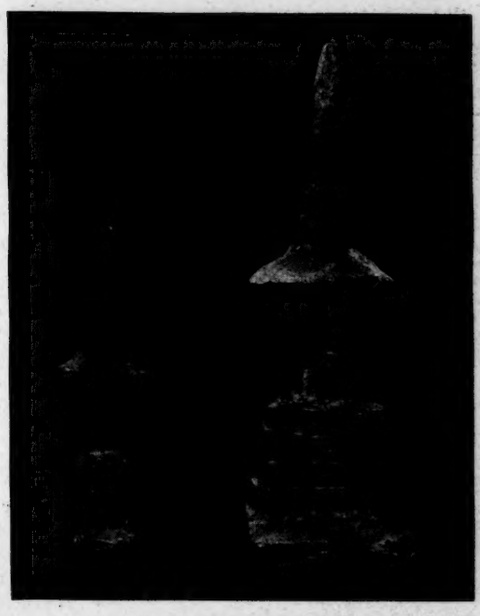
VENTILATING WORLD'S LARGEST HANGAR. The home of the dirigible *Macon* at Sunnyvale, Calif. Extending down the center of the roof is a rectangular ventilator to exhaust heated air and gases. The heated air passes up through the ventilator and aids in equalizing the temperature of the interior of the hangar.

MUSHROOM CAVE NEAR KANSAS CITY. Mushrooms are said to be particular about temperature and humidity conditions so that the cave is adequately ventilated. The caves were created in a stone quarrying operation and contain 70,000 sq. ft. of area for growing the mushrooms. The workers wear miners' caps for harvesting. A cooling and air conditioning system is being considered.

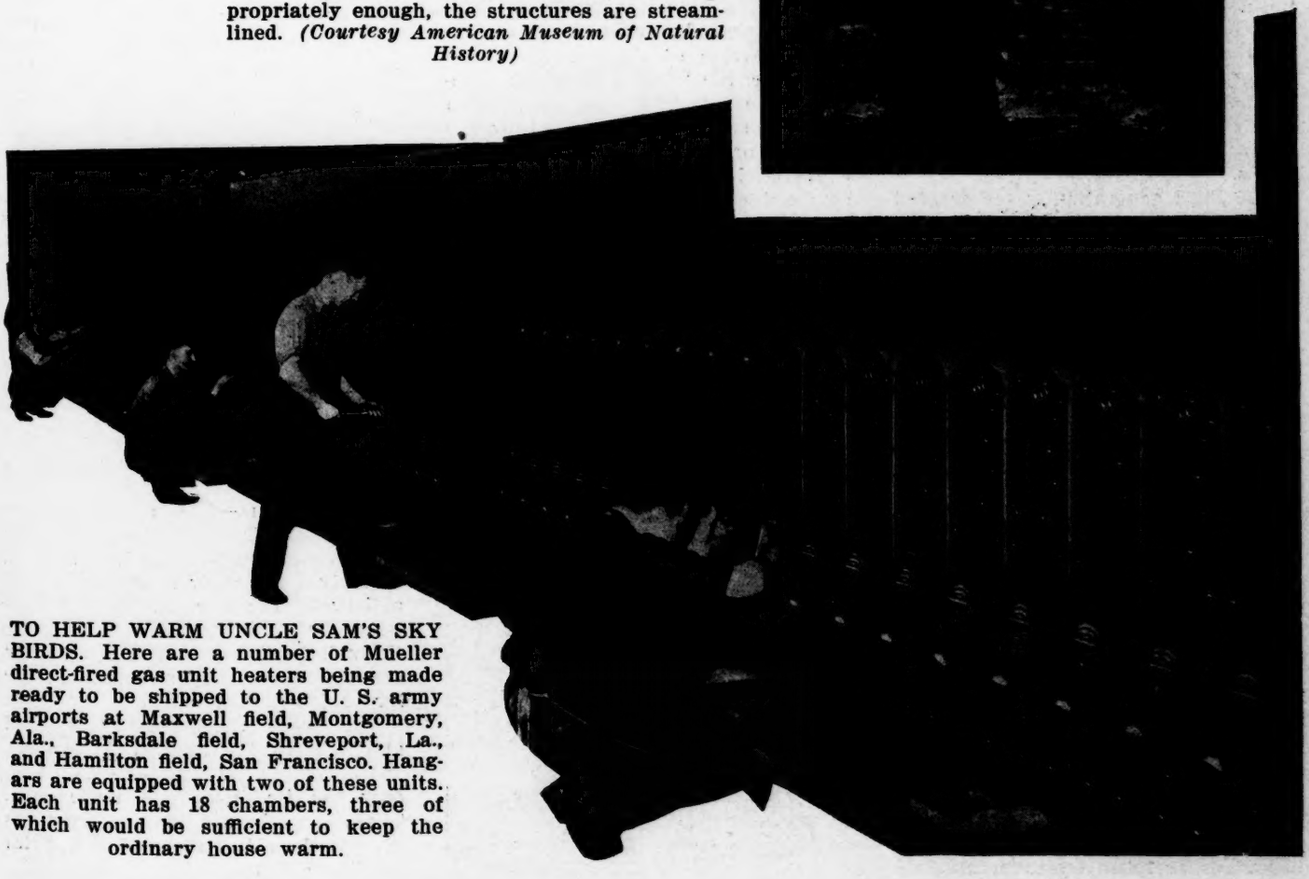


↑ADVERTISING A GAS CONDITIONING PLANT. Although there have been a number of gas-fired air conditioning plants installed in this country, this is said to be the first sign advertising a gas conditioned enterprise to the public. It is a restaurant in Jamaica, Long Island. (See story on page 40)

↑ELECTRIC HOTBED. 2160 feet of soil heating cable is used in this celery greenhouse. An inch of ground is placed over the cables, then a mesh screen and then 4 to 6 inches of soil. Current is thermostatically controlled. Plants are said to be healthier than when grown in heated air. *(Courtesy Rochester Gas & Electric News)*



QUETZALCOATL was the god of the air → of the Aztecs. Illustration shows clay models of temples erected to him, the original being 45 ft. high in the ruins of Chichen-Itza. Appropriately enough, the structures are streamlined. *(Courtesy American Museum of Natural History)*



TO HELP WARM UNCLE SAM'S SKY BIRDS. Here are a number of Mueller direct-fired gas unit heaters being made ready to be shipped to the U. S. army airports at Maxwell field, Montgomery, Ala., Barksdale field, Shreveport, La., and Hamilton field, San Francisco. Hangars are equipped with two of these units. Each unit has 18 chambers, three of which would be sufficient to keep the ordinary house warm.

Survey of O.B. Industry in N.J.

NEWARK, N. J.—A survey of the fuel oil industry in New Jersey was made public July 7 by the joint legislative committee named to investigate state codes. The report notes that the 550 units in the fuel oil industry had sales of $11.3 million. Reports submitted by the code director formed the basis of the survey which indicated that 90% favored retention of the code. The director's salary, $4,000, is the lowest in the trades surveyed. Assessments are one and two cents per 100 gal. of different grade oils sold.

Spokane Plans A.C. Show

SPOKANE—An air conditioning exposition sponsored by manufacturers and dealers is planned to be started in the near future here. The Spokane Bureau of Air Conditioning has been formed and D. H. Knapp has been elected president and H. C. Bender, secretary. About 50 dealers and allied members of the industry will be behind the exposition. A committee headed by L. K. Vallandingham is now engaged in perfecting the details of the show which is expected to attract visitors from a wide area.

To Standardize Furnace Equipment

NEW YORK — Cooperation of the National Bureau of Standards in the establishment of a commercial standard for warm-air furnace blowers and air conditioning equipment, has been requested by the National Furnace Blower Manufacturers Association.

The scope of the project will probably cover minimum physical requirements for construction, capacity, gauge and quality of materials, performance, freedom from noise, certification and labeling of power-driven warm-air furnace blowers, air washing, conditioning and cooling equipment and accessory apparatus.

Launches O. B. Campaign

BOSTON—An active campaign to promote the Kelvinator oil burner was inaugurated with the beginning of July by the Kelvinator Sales Corp., Boston, in the metropolitan area. Stephen A. Colahan, formerly head of the Dartmouth Sales Corporation, has been placed in charge of wholesale and retail sales operations.

Engineers Open Offices

NEW YORK—H. V. Cornwell and E. C. Blackburn, Jr., have opened consulting engineering offices at 750 Lexington Ave., New York, and 250 Fulton Ave., Hempstead, Long Island. The firm will engage in heating, ventilating and air conditioning, the design of power plants, and other mechanical equipment of buildings. Manufacturers are requested to send catalogs.

Knisely Succeeds Hamaker

CLEVELAND—Stanley A. Knisely has been appointed advertising and sales promotion manager of Republic Steel Corporation, with headquarters at Youngstown, Ohio. He succeeds L. S. Hamaker who was recently made vice-president and general manager of the Berger Mfg. Co., Republic subsidiary, of Canton, Ohio.

Sells Stoker for $275 Installed

PHILADELPHIA—One of the largest coal dealers is aggressively advertising completely automatic heat by coal. The Newton Supply Company, a subsidiary of the Geo. B. Newton Coal Co., Philadelphia, is introducing through local newspapers a specially designed, completely automatic stoker for $275 installed.

The stoker was originally designed and built by the Newton Supply Co., Baltimore Avenue and 53rd Street, only for its immediate trade area. There have been numerous inquiries in regard to it from coal companies in other cities.

Furnace Manufacturer and Stoker Builder Celebrate 50th Anniversary of Foundings

The year 1934 marks the 50th anniversary of Whiting Corporation, with John Hill Whiting, the founder, still active as chairman of the board. Mr. Whiting began his business career in Detroit in the seventies as a clerk in a car wheel foundry. Later he secured patents on an improved cupola and a car wheel cleaning machine and launched a new business, the Detroit Foundry Equipment Company.

In 1894 he built a small portion of the present plant at Harvey, Ill., and began to do business under the name of Whiting Foundry Equipment Company (later this name was changed to its present form—Whiting Corporation).

Closely associated with Mr. Whiting for the past 30 years and now president of the corporation is Gen. T. S. Hammond, perhaps best remembered as the Tom Hammond who was Michigan's star half-back in the early 1900's.

The third generation is represented by Mr. Whiting's grandson, Stevens H. Hammond, assistant to the president. There are thus three generations in active direction of the company.

Just 50 years ago, F. B. Fox, previously the agent for the Richmond Stove Company, organized The Fox Furnace Company in Cleveland.

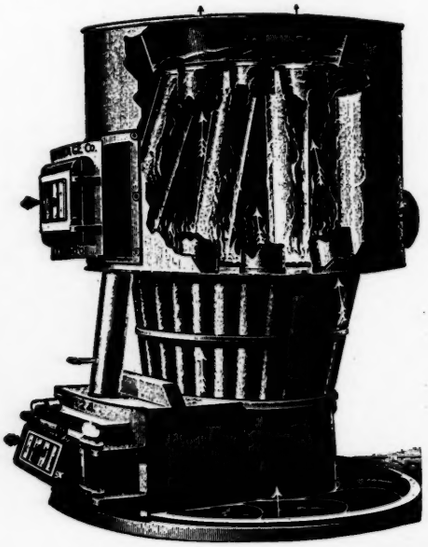
In 1894 Henry Wick purchased the young company and assumed its management, with Ernest C. Fox, son of the founder, continuing his association with the organization for some time thereafter. Mr. Fox is now proprietor of Independent Register Co.

In 1900, a site for a new factory was selected in Elyria. The factory and foundry building erected here had a floor area of approximately 37,000 sq. ft. New buildings and additions today occupy an area of approximately 25 acres. The American Radiator Company purchased control in 1923.

One feature of the company's furnaces was the "dust flue" which "connects the ash pit and combustion chamber so that dust created by the shaking or dumping of the ashes is conveyed by a natural draft into the smoke flue and not into the cellar."

Another feature was the "Air Tube" which draws the circulating air "directly over the hottest portion of the fire, warming the air with great rapidity."

(Right) A Fox furnace of the gay nineties. (Below) S. H. Hammond, J. H. Whiting, and T. S. Hammond, Whiting Corporation.



Delco Unit Shown to Dealers

NEW YORK—The first sales convention of General Appliance Corporation, Delco distributors in this area, held July 20 at the Hotel New Yorker, was the occasion for announcing Delco's new air conditioning unit. The announcement together with the additions and improvements in the line of burners met with an enthusiastic reception from a large crowd of dealers and distributors present. E. L. Sylvester, sales manager, acted as master of ceremonies and conducted the program from a specially set up stage, elaborately decorated and fitted up for theatrical lighting and display. J. L. Sedwick, advertising manager, showed by demonstration that the only satisfactory way to get prospects for Delco products is by active canvassing and solicitation. Mr. Sylvester pointed out that the new oil burner line lends itself very well to solicitation of large restaurants, apartments and stores, garages and buildings of that kind. He felt that a great opportunity in this connection was being overlooked.

Sales promotion manager E. L. Redden took over the meeting on behalf of the new air conditioning unit. This handsome metal-encased product was displayed and its several features carefully outlined. Mr. Redden also emphasized that Delco was prepared to offer help to dealers in the way of getting their men thoroughly trained in service and estimating on the unit. He announced that a school for this purpose would be held on July 23 for all interested servicemen.

The afternoon was devoted to detailed discussion of the plans for securing business during the last six months of 1934 and the early part of 1935.

BOSTON—A demonstration of the new Delco-Heat Conditionair was given July 18 before an assembly of 350 dealers, distributors and salesmen at the Hotel Statler. The meeting was an all-day affair, with an intermission for luncheon. Presentation of the new product was made on the stage with the following factory officials taking part in the dramatization and making addresses: E. L. Sylvester, sales manager; J. L. Sedwick, advertising manager; W. B. Montague, sales promotion manager; E. L. Redden, assistant sales promotion manager, and W. L. Jordan, accounting department.

Mr. Sylvester said that sales for the first six months of this year were 200% ahead of the whole of last year.

Holland Has New President

HOLLAND, MICH.—Edward H. Muhlenbrock was recently elected president of the Holland Furnace Company, succeeding H. W. Thorne, who resigned recently.

DETROIT STATLER INSTALLS CONDITIONING

Dr. Henry Vaughan, health superintendent of the City of Detroit, Frank A. McKowne, president, Statler Hotel Company, and L. W. Chubb, director of research for Westinghouse, examining one of the air conditioning units in the Statler Hotel.

Sears Roebuck to Sell Gas Boilers

NEW YORK—It is reported that Sears Roebuck & Company's branch here will place on sale about August 15 a gas-fired house-heating boiler. The unit, which includes burner and boiler, will be small and compact, and the price low.

The addition of gas-burning equipment will complete the company's line of heating appliances. Hand-fired boilers, furnaces, oil burners, gas conversion burners, and coal stokers are already being sold.

PITTSBURGH—Sears, Roebuck & Co., is selling stokers in this city for $245 installed. Payments are $27.50 down, $15 a month, and a carrying charge.

Ottawa to Improve Central Heat Plant

OTTAWA, CANADA—The Canadian heating industry is looking forward to the approaching autumn and winter trade with renewed optimism, due to the Federal Government having announced that it had allotted $40,000,000 for public works. The greater percentage of the money will be expended in the construction of new public buildings and the renovation of old ones. Ottawa is to receive $6,300 for central heating plant improvements.

Windowless Factory Planned

WALLINGFORD, CONN.—The Wallingford Steel Company has awarded to the C. F. Wooding Company the general contract for construction of a windowless office building which will contain a complete air conditioning system for both summer and winter use. The building is planned to be soundproof and will be illuminated by both incandescent and mercury vapor lamps.

The steel company's plant is located on sandy terrain, from which clouds of dust are constantly stirred up, and the constant presence of switch-engines on nearby sidings creates a smoke nuisance. The existence of these local conditions led to the decision to erect a building without windows in which ventilation with conditioned air would be possible. In the present office building, which is conventional in design, the smoke and dust condition makes opening of windows inconvenient even in mid-summer.

Tentative plans call for heating, refrigerating, and humidity control equipment in the basement, with automatic controls. Walls will be lined with Celotex and the roof insulated with rock wool, thus shutting out the noise of the steel mill as well as simplifying temperature control. Estimated cost of the building proper is $15,000.

Modernize College Plant

HOLYOKE, MASS.—Daniel O'Connell's Sons, Inc., of this city has been awarded the $82,227 contract for renovating the steam system of Massachusetts State College, Amherst. The contract calls for the construction of about 3800 ft. of concrete tunnel and several hundred feet of concrete duct to supplement existing lines and provide transmission of steam to the two PWA buildings, the Thatcher dormitory and Goodell library, now under construction.

A.C. Theater for Roumania

BUCHAREST—The first air conditioned theater in Roumania is being built on one of the main boulevards of this city. It will be a cinema with a capacity of some 2500 seats. Air conditioning equipment will be of American manufacture.

Ashley Designed Shillito System

The air conditioning system in the John Shillito department store, Cincinnati, described in last month's HEATING AND VENTILATING, was designed by the office of E. E. Ashley, New York consulting engineer.

Timken Starts Regional Conventions

DETROIT—Executives of The Timken Silent Automatic Company met with the field organization in a series of regional conventions which started July 30 and will continue to August 7 in seven cities in the East and Middle West. The principal purpose of the meetings is to present the new products recently announced and cover Fall merchandising plans.

The new products are the air conditioning oil-furnace, a complete heating unit for installation in warm-air heating systems; the line of oil-boilers and the new pressure burner.

Ives with Ray Heat & Power

CHICAGO—F. H. Ives, for many years Ray Burner Company field representative, has retired from traveling duties, and become associated with the Ray Heat & Power Co., 600 West Van Buren St., Chicago, in the capacity of vice-president and consulting engineer.

Marsh Joins Iron Fireman

PORTLAND, ORE.—Thomas A. Marsh, former president of Modern Coal Burner Co., Chicago, has joined the Iron Fireman Manufacturing Company as central division engineer.

Mr. Marsh is one of the best known figures in the fuel, combustion, and stoker field. Since his graduation from the University of Illinois in 1904, his professional life has been devoted to fuels and fuel-burning equipment. During the period 1913-1921 he worked up from service man to chief engineer of the Green Engineering Company. From 1921-1930 he was western engineer for the Combustion Engineering Corporation. He is the author of a book, "Combustion in the Power Plant."

Mr. Marsh lives in Chicago and his business headquarters will be the Iron Fireman Chicago office at 660 North Wabash Avenue.

NEW YORK—Some 35 Iron Fireman dealers and salesmen met in the offices of the Royal Fuel Co., Morristown, N. J., July 25 to discuss mutual problems involved in the sale and installation of the mechanical stokers manufactured by the Iron Fireman Co., Portland, Ore. Such gatherings are held monthly, membership of the group including practically all Iron Fireman dealers in the Metropolitan area.

COMING EVENTS

AUGUST 15-24, 1934. *National Schoolmart and National Schoolview Exposition and Conference, New York Port Authority Building, New York. Under the auspices of National Association of Public School Business Officials; Teachers College, Columbia University, and New York University School of Education.*

AUGUST 27-SEPTEMBER 1, 1934. *Second Annual Convention and Show of the National Association of Power Engineers, Minneapolis, Minn.*

SEPTEMBER 19-29, 1934. *Second Annual National Electrical and Radio Exposition, Madison Square Garden, New York.*

OCTOBER 29-NOVEMBER 2, 1934. *Sixteenth Annual Convention and Exposition of the American Gas Association, Atlantic City Auditorium, Atlantic City, N. J.*

DECEMBER 3-8, 1934. *Eleventh National Exposition of Power and Mechanical Engineering, Grand Central Palace, New York.*

Russell New G.M. of Drying Systems

CHICAGO—B. B. Russell has been appointed general manager of Drying Systems, Inc. Mr. Russell has been connected with the company for 16 years as sales engineer and vice-president. He succeeds C. H. Currier, formerly general manager and recently president, who has resigned to accept a position with another company. It is expected that Mr. Currier will continue as director of the company.

1300 Ton A.C. Plant for Rockefeller Center

NEW YORK—Plans and specifications have been prepared for the complete air conditioning of the new 40-story and two twin 6-story structures at Rockefeller Center. Plans call for a total of about 1300 tons of refrigeration.

Adams Engineering Company has been awarded the heating, ventilating and air conditioning contract for the new "Sherry Shop" located in the Sherry Netherland Hotel. A 25-ton freon refrigerating plant made by Westinghouse is being installed.

A 10-ton fully automatic service cooling system of air conditioning was recently installed in the Barclay Hotel Cafe Lounge. G E. equipment with a Barber-Colman temperature control system was used.

Plans have been announced for the air conditioning of a new bar-room and foyer in the Waldorf Astoria. A 25-ton freon refrigerating plant will be installed.

A.S.H.V.E. Codes Adopted

NEW YORK—Testing and rating codes for vacuum pumps, air filters, and hot water convectors have been approved by the members of the A.S.H.V.E. by letter ballot. The pump code was tentatively approved at the 40th annual meeting and the vote now makes its adoption by the Society final. The other two codes were tentatively approved at the semi-annual meeting in Detroit in 1933.

Foster Appoints Crawford

NEWARK, N. J.—Henry J. Fortier, New York City representative for the Foster Engineering Company, has been transferred to the North Jersey territory.

Foster will be represented in New York, Long Island, and Westchester by the Crawford Engineering Co., 295 Madison Ave., New York.

Original System Satisfactory

EDITOR, HEATING AND VENTILATING:

In your June issue, page 39, is illustrated a thermal compressor equipment installed in the Paradise restaurant in New York. From the description you give it seems to me that the inference may be drawn that the original ventilating system was not satisfactory.

As a matter of fact the original ventilating system was intended only to carry the restaurant over its first winter. The owners retained me as a consultant to design a complete air conditioning system to be installed in two sections: first, a system of ventilation which would take care of their requirements during the winter months as the restaurant was opened in the month of December. Secondly, to install air cooling and conditioning equipment to work in conjunction with the original system. The work was carried out exactly as designed and the original system worked perfectly during the cooler months. The owners did not wish to make any further capital investment till it was necessary to install the cooling system.

During the late spring the cooling and conditioning equipment was installed and since the work has been completed has worked perfectly. The system is automatically controlled and requires very little attention.

I believe that in an early issue you should correct any possible impression that there was any improper design in the ventilating system.

Respectfully yours,

EDWIN A. KINGSLEY.

The article did not intend to imply any fault with the design of the original system.—EDITOR

NEW EQUIPMENT

Temperature Corp. Room Coolers

Temperature Corp., 405 Lexington Ave., New York, a Chrysler affiliate, has placed on the market a line of room units for cooling, heating, humidifying, and circulating air. They are available in 12 finishes. The units have aluminum extended surface with a cooling capacity of 200 B.t.u. per min., when circulating 50° water at 30 lb. per min., with air volume at 600 f.p.m., and entering air at 80° dry bulb, and 50% relative humidity. The heating capacity of the unit is 240 sq. ft. of steam radiator. Separate coils for cooling or heating are available and the heating coils are equipped with metering orifices on order.

Piping connections include a ½ in. I.P.S. copper tubing for the spray line; ½ in. for the steam inlet and condenser outlet; ½ in. I.P.S. water inlet; and water discharge.

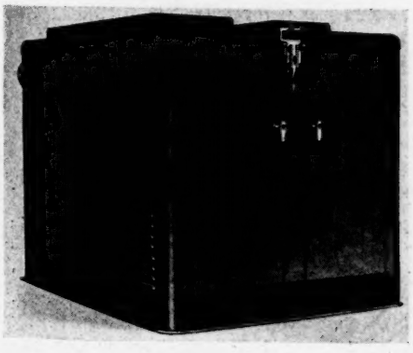
Two double 6-in. blowers with 7¾ in. faces and aluminum blades are used. A ⅛ hp. Emerson motor drives the fan. The spray nozzles deliver 1½ lb. of water per min., at 2 lb. pressure.

Controls are supplied as required.

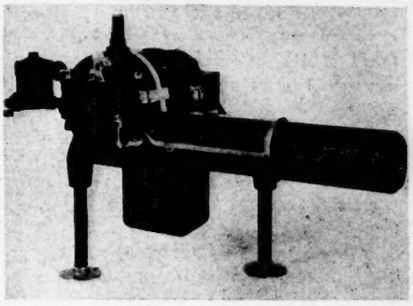
A line of freon condensing units up to 15 tons capacity are available in two types, one using the refrigerant to chill the water which is circulated to the room units and the other for circulating the refrigerant directly to the evaporator coil in the unit.

Delco Conditionair

Delco Appliance Corporation, Rochester, N. Y., has introduced the model DA Delco-Heat Conditionair. The unit humidifies, heats, filters and circulates the air. It is finished in a green furniture-steel cabinet with chromium trim. Automatic controls include thermostat, protectorelay, airstat, furnacestat, and summer switch.



Delco-Heat Conditionair



Norge Corp. Burner

Norge Oil Burner

Specifications of the Norge Corp., Detroit, oil burner, recently announced, have been released.

The burner is available in three models, N-8, N-18, and N-28. It is said to be capable of handling an entire plant from the smallest home to the largest industrial building. The N8 is the domestic burner and the one illustrated.

This unit has a whirling flame obtained from a patented design of multiple vanes. An electric ignition system is used with shielded secondaries and a built-in radio interference eliminator. The motor is of the 1/10-hp. split-phase a. c. type, operating at 1750 r.p.m., with a maximum starting torque of 15 amp. and 2.8 amp. while running. The fan is of fabricated light aluminum weighing only 10 oz. A rotary type pump with a capacity of 20 gal. per hr. is used. The device has been listed by the Underwriters Laboratories.

Dry-Al

United Hamilton Products, Inc., 82 Oxford Ave., Buffalo, N. Y., is marketing Dry-Al, a dehydrating material. It is supplied as a unit 5½ in. in diameter, 3½ in. when enclosed, 6 in. when opened for use. It has a silver finish and contains a chemical which will absorb moisture.

The unit is designed for use by banks and institutions in vaults, storerooms and basements. It is guaranteed for six months, as a minimum, and retails for $36 per dozen.

Green Stoker Redesigned

In order to provide for fixed attachment of controls, a frame construction capable of coping with expansion, and simple conversion to forced draft if desired, Combustion Engineering Co., Inc., New York, modified the design of its Green natural draft chain grate stoker. Instead of a cast-iron frame supported on wheels, as formerly employed, the new design, designated as the KS, has a stationary structure, fixed into the setting. This consists of transverse channels supported on posts at either side, to which in turn are fastened angles parallel to the side walls; skids supported on I-beams carry the weight of the chain at the bottom. A pipe, flush with the side wall and extending nearly the length of the stoker, carries the adjusting rod and takes the tension off the frame. While the take-up in the tension of the chain is at the rear, the actual adjustment is at the front, which is always accessible.

Auburn Oil Master

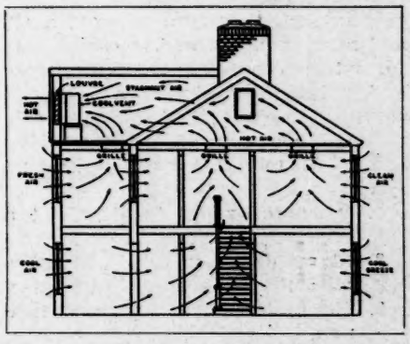
The Auburn Burner Corp., Auburn, Ind., has placed on the market a cast-iron boiler-burner unit designated the "Oil Master." The unit is available in four sizes of ratings from 450 to 940 sq. ft. of steam radiator.

Autovent Coolvent

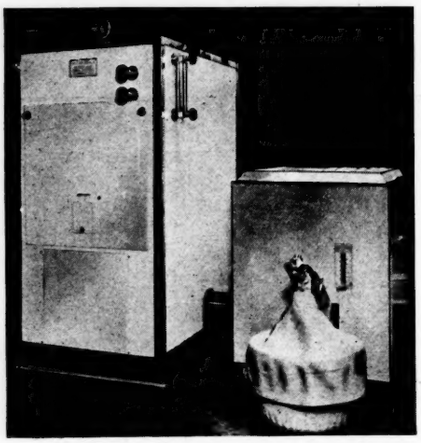
Autovent Fan & Blower Co., 1805 North Kostner Ave., Chicago, has announced the Coolvent system of attic ventilation. This consists of a propeller fan with motor and square casing for installation in the attic. The purpose of the fan is to pull air from the downstairs floor up through the attic and down to the outside at night, thus cooling off the house.

The company recommends two different arrangements, one being with a single grille in the ceiling and connected to the fan immediately above. A second arrangement is to locate the fan unit at an attic window and connect it between the unit and the grille with noise-absorbing material. Several grilles can be used in the attic floor to pull air through from the second floor.

The fan is available in four sizes with motor capacity from 1/5 hp. to ½ hp.



One Method of Installing the Coolvent



Stoker-Boiler Unit for Anthracite Burning

E. F.-M. and Arco Boiler-Stoker Unit

The Electric Furnace-Man, Inc., 7 Dey St., New York, and the American Radiator Co., 40 West 40th St., New York, have introduced a combined stoker-boiler unit for burning anthracite. The unit, which is finished in white, is available in combinations of one of four sizes of boiler with one of three sizes of stoker, and with capacity ranges from 700 to 1300 sq. ft. of steam radiator. Similar units are available for hot water. The stoker is the E.F.-M underfeed type. The three stokers, which can be used with the combination, have maximum fuel rates of 26, 40 and 54 lb. of rice anthracite per hour.

The boiler is the Ideal No. 21, and is designed especially for automatic coal firing.

The boiler has a curved crown sheet and a four-pass gas travel. A pyrex glass observation port is provided in the front. A Taco heater with capacity to supply a 100-gal. tank is built in.

Minneapolis-Honeywell Weatherstat

A new type of outside control, known as the Weatherstat, has been announced by the Minneapolis-Honeywell Regulator Co., Minneapolis, Minn. The control is designed to react to temperature, wind direction, wind velocity, and solar radiation and to compensate for outside changes by supplying more or less heat to the building or zone it controls. The Weatherstat is applicable to almost any type of building having one of the following types of heating systems:

1. Steam or vapor furnished at a relatively constant pressure.
2. Steam or vapor furnished intermittently by a gas or oil burner.
3. Hot water under forced circulation.

In the latter two types of heating systems, provision must be made for keeping the boiler water up to a predetermined temperature at all times in order to prevent a time lag.

The Weatherstat consists of a mass of iron, sufficient to obtain the necessary thermal capacity. This iron is shaped to contain a thermostatic element with the necessary electric contacts, and is arranged to house a small electrical heating element within the mass.

This unit is mounted in a small waterproof housing and the entire unit is securely mounted in a location in which it will be subject to the same weather conditions, temperature, wind direction, wind velocity, and solar radiation as the zone or building which it controls.

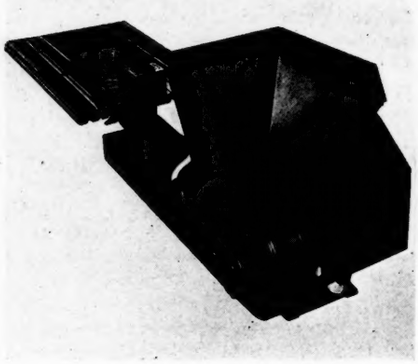
The heat release from the electrical heating element is designed to, and by an adjustable resistance can be made to, bear the same relation to heat losses from the control housing as the heat release from the heating fixtures within the building bears to heat losses of the building.

Being subject to the same weather influences, and the same relative rate of heating and cooling, the temperature throughout the zone or building and the temperature within the control housing will maintain a fixed relationship, and the temperature in the control housing can be used as the pilot temperature or control temperature for the zone or building.

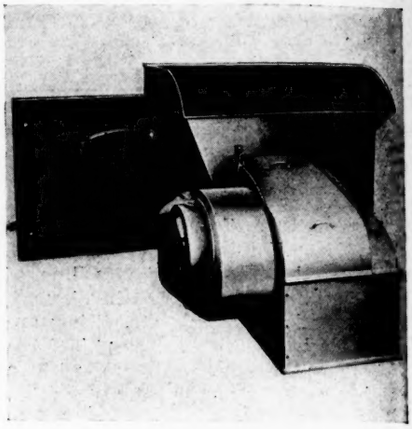
Whiting Dual Draft Stoker

Whiting Corporation, Harvey, Ill., has announced a new line of domestic and commercial stokers. The domestic stokers are made in three sizes with capacities of 30, 60 and 90 lb. of coal per hr. The commercial units are made in 10 sizes with capacities ranging from 90 to 1250 lb. per hr.

The stokers are equipped with a control which allows the air supply to be varied with the rate of fuel feed. It also has a smoke eliminator which prevents back smoking. All units have a speed reduction of 5500 to one, with great power. Speeds are changed by turning the dial. A masterstat control insures a constant pilot fire.



Whiting Dual Draft Stoker



Type S Combustion Engineering Stoker

C-E Stoker Unit, Type S

A new self-contained stoker unit, designated as Type S and intended for small heating and industrial plants having either fire-tube or water-tube boilers, has been brought out by Combustion Engineering Co., New York. It has a screw conveyor which advances the coal from the hopper to the entrance of the retort and a reciprocating pusher in the retort continues the feeding and provides agitation for the fuel bed. Coal distribution is accomplished by the lateral movement of moving grate bars which alternate with fixed bars.

An integral blower, with inlet damper control, supplies air to the windbox under the stoker. The volume of air is regulated automatically through a control lever to suit the stoker speed. A constant speed motor drives the stoker through an integral variable-speed transmission permitting 16 rates of coal feed. Coal feed may be cut off by means of a clutch so that the fan may continue to operate for burning out the fuel.

The stoker is designed so as to employ either a center or a side retort, the former being shown in the accompanying view. The small clearances required permit installation, in most cases, with only slight alterations in the setting and the brickwork is seldom disturbed. The stoker body is shipped completely assembled, in a series of sizes, for installation under the boiler.

Oster-Williams Pipe Assembly Bench

Oster-Williams, 2057 East 61st Pl., Cleveland, has announced a pipe welding assembly bench. This fixture is capable of handling all sizes of pipe up to 12 in. in diameter and will line up and hold in position for tacking, fittings, flanges and branches at any angle. For handling longer lengths an extension bench can be supplied.

Adjustable elevator, which can be used at any position on the main bench or on the extension, controls the vertical alignment of the work.

The main bench and extension consist of an eyebeam mounted on tubular legs, with sufficient spread to eliminate tipping. The main bench weighs 700 lb. and the extension 300 lb. The bench can be disassembled for portability and reassembled quickly and easily.

The dimensions of the main bench eyebeam are 8 ft. long, by 1 ft. wide and the extension 6 ft. long by 1 ft. wide. Their height is 2 ft.

Super-Aire Blowers-Washers

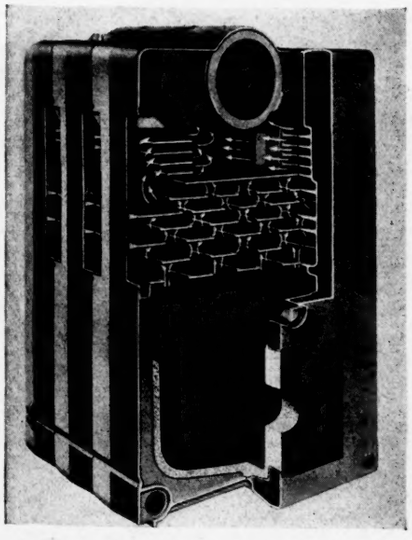
Super-Aire Co., 3032 Olive St., St. Louis, announces that its line of blowers for air conditioning in cafeterias, ranging from 10,000 to 60,000 c.f.m., are now available to manufacturers of air conditioning systems and contractors.

These blowers have a new design wheel, built on the turbine principle, with three blades per inch of wheel diameter. Thus, a 50-in. wheel has 150 blades. This permits operation at extremely low, quiet speeds with high efficiency. All blowers have ball bearings and V-belt drives.

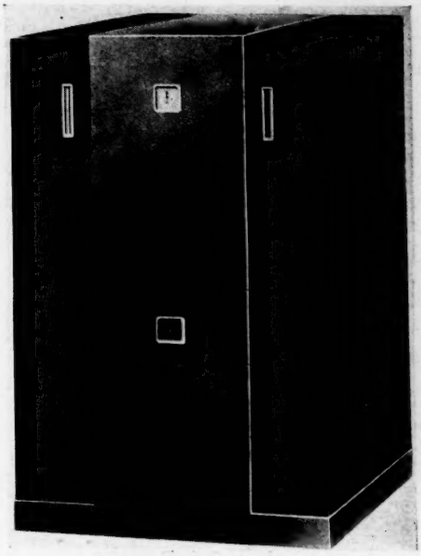
The company also manufactures a line of low-cost air washers and air diffusers, both stationary and automatic.

U.S. Radiator Series O Boiler

The O Series Capitol oil-burning boiler is the latest product of the United States Radiator Corp., Detroit. It is of the cast-iron square type, designed for horizontally fired burners.



Cutaway View of U. S. Oil-Burning Boiler



Capitol Series O Boiler

A feature is the fire travel which, contrary to usual practice, rises upward between each section. On the face of each section are carefully proportioned cast-iron ribs which are integral with the boiler casting. The gases traveling through the passages formed by the ribs have their direction constantly changed.

Other features of the boiler include a wet base; that is, there is a water space extending across the bottom of the combustion chamber. The boiler, which is equipped with a jacket, is finished in jet black and lustrous green.

It is available in five sizes for both steam and water with ratings ranging from 780 to 2030 sq. ft. of steam radiator and equivalent in water.

The company has published a catalog, Form A-12, describing the boiler.

York Soundproof Room Units

York Ice Machinery Corp., York, Pa., announces a decorative soundproofing cabinet, veneered in walnut, to harmonize in appearance with the appointments of an exclusive home, office, or lounge.

To absorb sound, built-up layers of 1-in. hairfelt and ⅜ in. insulating board are used. The cabinet is isolated from the base and the floor by felt seal and support strips. The top of the cabinet is removable, making the interior readily accessible for inspection or adjustments. The legs elevate the whole cabinet sufficiently from the floor to allow cleaning under the cabinet. An adjustable feature is also provided for the leveling of the unit on an uneven floor.

An improved type of protective cage for York condenser units is also announced. This cage is constructed of heavy mesh expanded metal, with a framework of formed angle iron. Its open mesh construction permits full vision of the entire unit and free circulation of air. At the same time, it completely covers and protects the unit. By means of special floor clips, the cage may be locked in place to prevent any tampering with the unit. The cage may also be readily removed for adjustment or inspection.

Oberdorfer Sump Pump

The B. 2400 sump pump has been announced by the M. L. Oberdorfer Brass Co., Inc., Syracuse, N. Y. The unit is constructed of bronze, and has a ¼-hp. rustproof, quiet motor, with no radio interference. The pump is of the centrifugal type with open impeller to allow the passing of solids. The control is of the positive type actuated by an over-size ball float.

The capacity of the unit is 2400 gal. per hr. against a 1-ft. head or 400 gal. per hr. with a 20-ft. head.

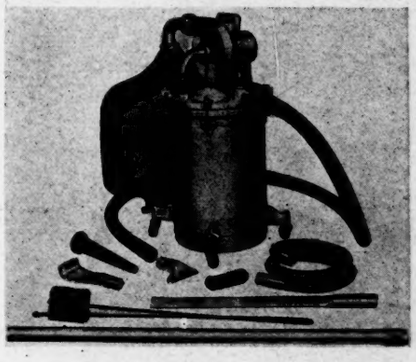
Tornado Cleaner

The Breuer Electric Mfg. Co., 852 Blackhawk St., Chicago, has announced the Model 112 Tornado furnace and boiler cleaner, a heavy duty unit.

The unit is particularly designed for furnace dealers and heating contractors who desire to increase their business by taking on cleaning of heaters with the possible advantage also of obtaining a worth-while list of prospects for modernizing installations. The unit is constructed particularly for heavy-duty service.

Specifications include a 1-hp. ball bearing motor, a weight of 45 lb., and a complete set of 10 standard attachments.

Special feature of this machine is the observation glass which allows the operator to see dirt being removed when cleaning in out-of-the-way corners. The motor unit can be removed for use as a handy blower. Special tools are also available for cleaning all types of special heating apparatus and accessories.



Vacuum Cleaner for Heaters

Arco Incinerator and Hot Water Heater

A hot water supply heater built so that it also serves as an incinerator for the household garbage, has been placed on the market by the American Radiator Co., New York.

The unit consists of the company's "Scuttle-a-Day" solid fuel heater, with a basket-shaped iron receptacle for garbage placed above the fire-box. Hot gases and radiant heat from the fire in the heater come in close contact with the garbage, and completely consume it without odor. Special construction of the garbage compartment removes danger that the fire will be smothered or killed by the refuse.

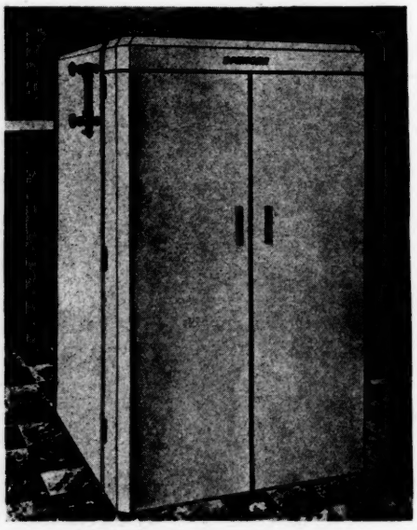
A special flat top on the unit makes possible a third special use of the equipment, as a heater for laundry or other similar purposes.

Shaking grates are designed to make it possible to burn small size fuels. The water sections are provided in two heights to provide varying water capacities, one size with a tank capacity of from 40 to 60 gal. and the other with a tank capacity of from 70 to 90 gal.

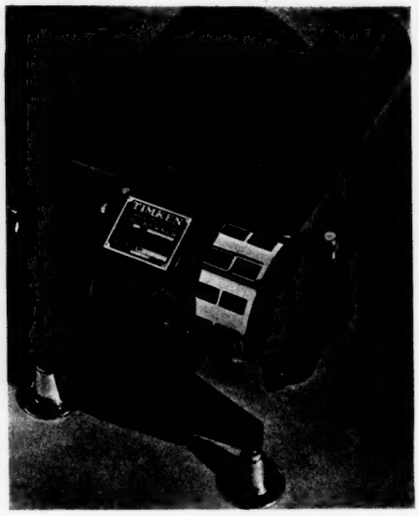
Spencer Magazine Boiler for Large Size Coal

A magazine feed boiler, designed to burn chestnut size anthracite or coke, has been announced by Spencer Heater Co., Williamsport, Pa. Designed for the larger anthracite fuels, the boiler includes a water-jacketed magazine for holding a day's supply of fuel; sloping grates, and automatic coal action similar to that in the company's line of buckwheat-burning boilers.

The new boiler is known as the C-N Spencer. The colored steel jacket is offered as optional equipment at a small additional charge.



Spencer Magazine Boiler



Timken Oil Burner

Timken Pressure Burner

The Timken Silent Automatic Co., 100 Clark Ave., Detroit, has announced a pressure type burner which will permit the company to serve boilers of unusual dimensions which could not be taken care of by the company's wall-flame models. The burner is of the straight pressure atomizing type and is equipped with intermittent electric ignition. It uses a dual circulating and pressure pump and an air deflector of exclusive design. It has a capacity of 1000 sq. ft. of steam radiator.

Oxweld Oxygen Regulators

The Linde Air Products Co., 30 East 42nd St., New York, recently announced that an improved screen filter is now being incorporated in its Oxweld oxygen regulators. This improvement gives greater protection against foreign matter entering the regulator. Instead of using a flat screen across the inlet, a double, cone-shaped bronze screen has been developed. A cone of coarse metal screen fits inside one of finer mesh, and both are held in the inlet nipple by a newly developed locking screw.

Carrick Adjustable Flo-Trol Valve

Carrick Engineering Co, Michigan City, Ind., has announced the Carrick type FT No. 1 adjustable Flo-Trol valve, of the moving plug type. The valve body and all external parts, except the lever, are of cast hard bronze for ordinary steam pressures and temperatures. Steam passing through the valve does not come in contact with the valve seats, eliminating the effects of wire drawing. Although the valve is designed primarily for the control of steam it is entirely suitable for the control of other fluids, such as oil, gas, or air.

The valve is generally controlled by some automatic device. In such a case the valve is part of a combustion control system. The lever of the valve is moved automatically to secure a variation of steam flow for speed control of the engine or turbine driving the stoker or fan. The manually adjustable feature of the valve makes it possible to secure the required range of speed to be effected by the movement of the valve lever. All adjustments can be made easily, while the valve is in service.

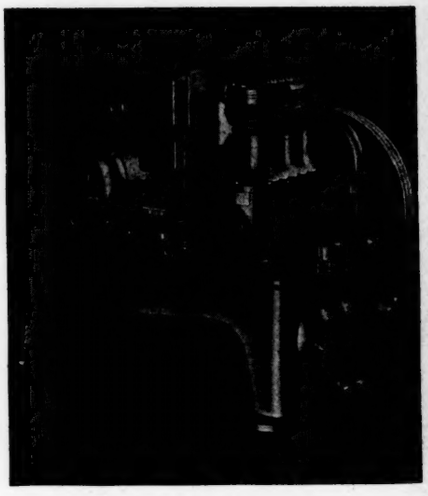
Rochester Check Valve

Rochester Circulator Corp., P.O. Box 23, Rochester, N. Y., is offering the Rochester floating check valve in pipe sizes to suit any hot water heating system. It is especially adapted for use on systems intended also to provide domestic hot water.

York Freon Balanseal Condensing Units

Completion of two new freon condensing units, consisting of 3-hp. triple-cylinder and 7½-hp. double-cylinder Balanseal compressors is announced by York Ice Machinery Corp., York, Pa., as the most recent additions to its line of air conditioning and refrigerating equipment. The introduction of these units increases the number of freon refrigerating units of the Balanseal series now available to 14 sizes, ranging from ¼ hp. to 7½ hp.

Triple-cylinder unit is a 2⅝ in., 3 hp. compressor, with water-cooled condenser. The space required for this compressor unit is 3¼ in. narrower than the Model 442-FW of the same capacity, with a 10 in. reduction in height. This reduction in head room permits of its installation within smaller areas than was possible with previous units of the same size and capacity.



York Condensing Unit

Especially made for COOLING COILS

For cooling coils in modern ventilating and air conditioning systems, soundness and dependability of the pipe are highly important. To minimize losses of material in the coiling and bending operations, with attendant loss of time and labor, and to be sure of a sound, tight, workmanlike job when the installation is complete, be sure to specify NATIONAL Pipe for Ammonia Purposes. NATIONAL Pipe for this type of installation is not an ordinary product, but is a specially made and specially tested material that promises long, efficient, uninterrupted service. Behind the manufacture of this special, strong, ductile pipe are the experience, skill, and facilities of the largest manufacturer of tubular products in the world—an organization that has known intimately for years the requirements of this exacting use. Approval of ice-machine manufacturers, consulting engineers, and leading heating and ventilating engineers the country over has made it—

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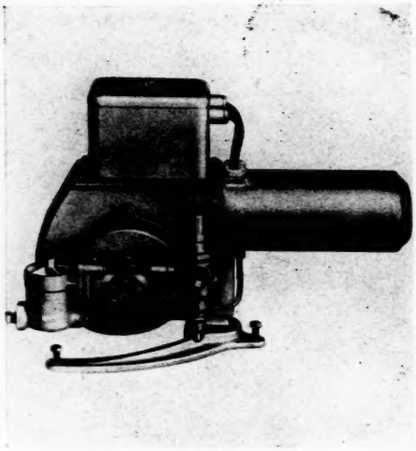


Monogram Burner

Monogram Oil Burner

Monogram Oil Burner Co., Roselle Park, N. J., has announced a burner which is offered to dealers either under the name Monogram or under the dealer's own insignia. It has a capacity of 4 to 5 gal. per hr., and sells in the very low price bracket. It is finished in opalescent gold and bronze and is constructed of standard parts so that replacements are easily available.

Barber-Colman Compensated Control

Barber-Colman Co., Rockford, Ill., has placed on the market a system of Compensated Control for zone temperature maintenance, providing automatic control under changing weather and occupancy conditions. Three advantages are claimed for this system, the first being that it adjusts the temperature of the heating mechanisms, such as the radiators, in accordance with the change in heat loss. Second, the controls operate at a fixed temperature point, rather than between the limits of some differential, and third, a detent thermostat is used to avoid chattering.

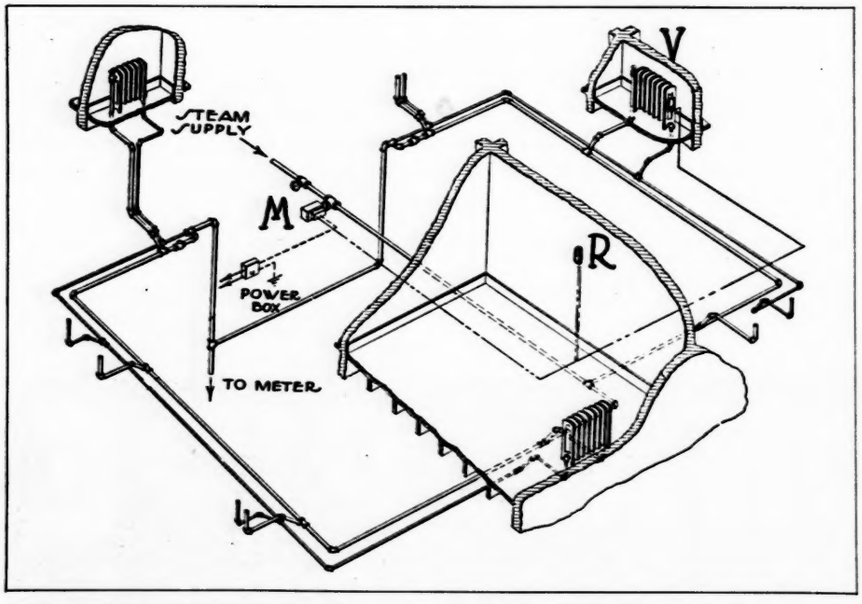
The illustration shows a group of rooms which constitute a zone. The zone, in which is a motor-operated valve, M, is supplied with steam. This valve is of the on or off type, and opens or closes in accordance with impulses originating at the room thermostat, R. The room thermostat is aided in its operation by a variable limit thermostat mounted on one of the radiators, V.

The room thermostat contains a small electric heater capable of slowly raising the temperature of the thermostatic element several degrees above room temperature. This heater is controlled by the variable limit thermostat which, since it has a friction coupling, operates on a change in temperature instead of at a fixed point.

When the room thermostat calls for heat the valve M opens and admits steam. As the radiators warm up, the thermostat, V, rises a few degrees and closes, energizing the heater in the room thermostat. Consequently, it anticipates the normal lag. Continued rise in radiator temperature causes the friction coupling to slip. If the room is several degrees cooler than the thermostat setting, there will be a greater delay before the valve is closed. The radiators therefore become warmer and heat the room up more quickly. In any case, the steam to the radiators is shut off sooner than if only a single conventional thermostat were used.

While the radiators hold their temperature the room thermostat heater remains energized, keeping the steam valve closed. The element of the variable limit thermostat is so constructed that it will open the contact as soon as the radiator temperature drops slightly. Then the heater in the room thermostat cools off and the thermostat adjusts itself to room temperature.

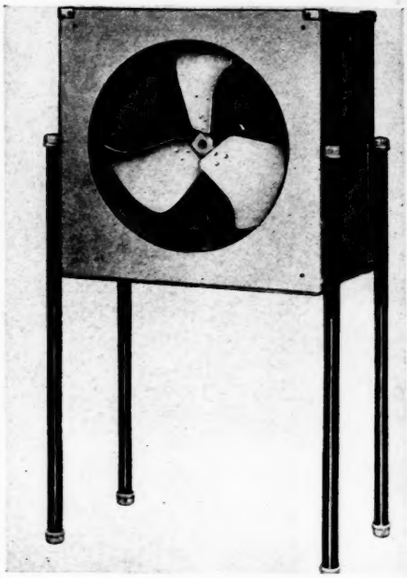
After the heater element is shut off the room thermostat returns to room temperature and if the rooms have not received enough heat will close its cold contact, the valve will be open again, and the cycle repeated.



Location of Principal Elements of Compensated Control System

G. E. Air Circulator

An air circulator, for use in inducing comfortable conditions in the home during hot weather, has been announced by the Air Conditioning Department, General Electric Company.

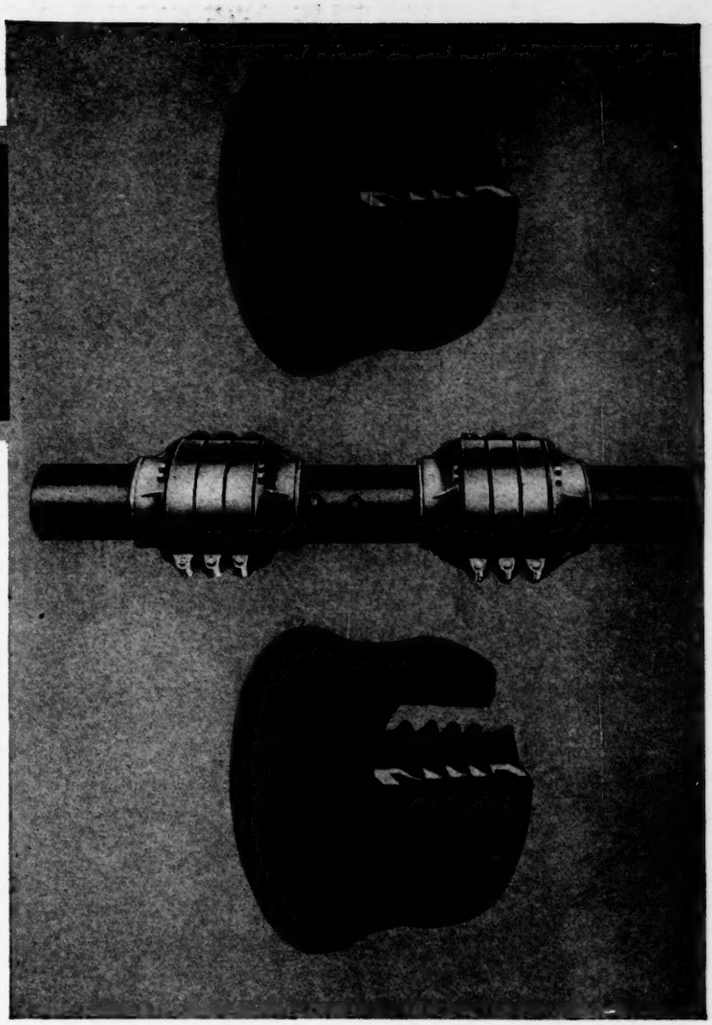


Air Circulator

The Type HV-1 circulator consists of a rubber-cushion-mounted motor directly driving an 18-in. propeller fan assembled in a sturdy metal cabinet, finished in gray and nickel. The fan operates at 860 r.p.m. and delivers 2050 to 2600 c.f.m., depending upon the amount of back pressure. The device may be set in front of an attic window and suitably connected to the nearest electric outlet, or it may be permanently installed with a duct connection to the outside and with permanent electric wiring and a time switch.

The air circulator is available with either an a.c. or a d.c. motor, as required. The automatic time switch, available as an accessory, is of the mechanical type and can be set for any period up to 10 hr. A manual wall switch and a metal duct attachment can also be obtained, the latter being provided with louvers.

Badger Expansion Joints . . .



Maintenance— NO

Long Life— YES

The Badger Directed Flexing Expansion Joint has two features which are not found together in any other type of joint. No maintenance is involved because it is the corrugated type of joint. The Directed Flexing feature provides exceptionally long life for this type of joint.

Both of these features mean money saved for the user. He doesn't have to pack the joints or maintain them. He gets many years of service.

Badger Directed Flexing Expansion Joints carrying these two features are made in sizes up to 30 inches, flanged or welding ends.

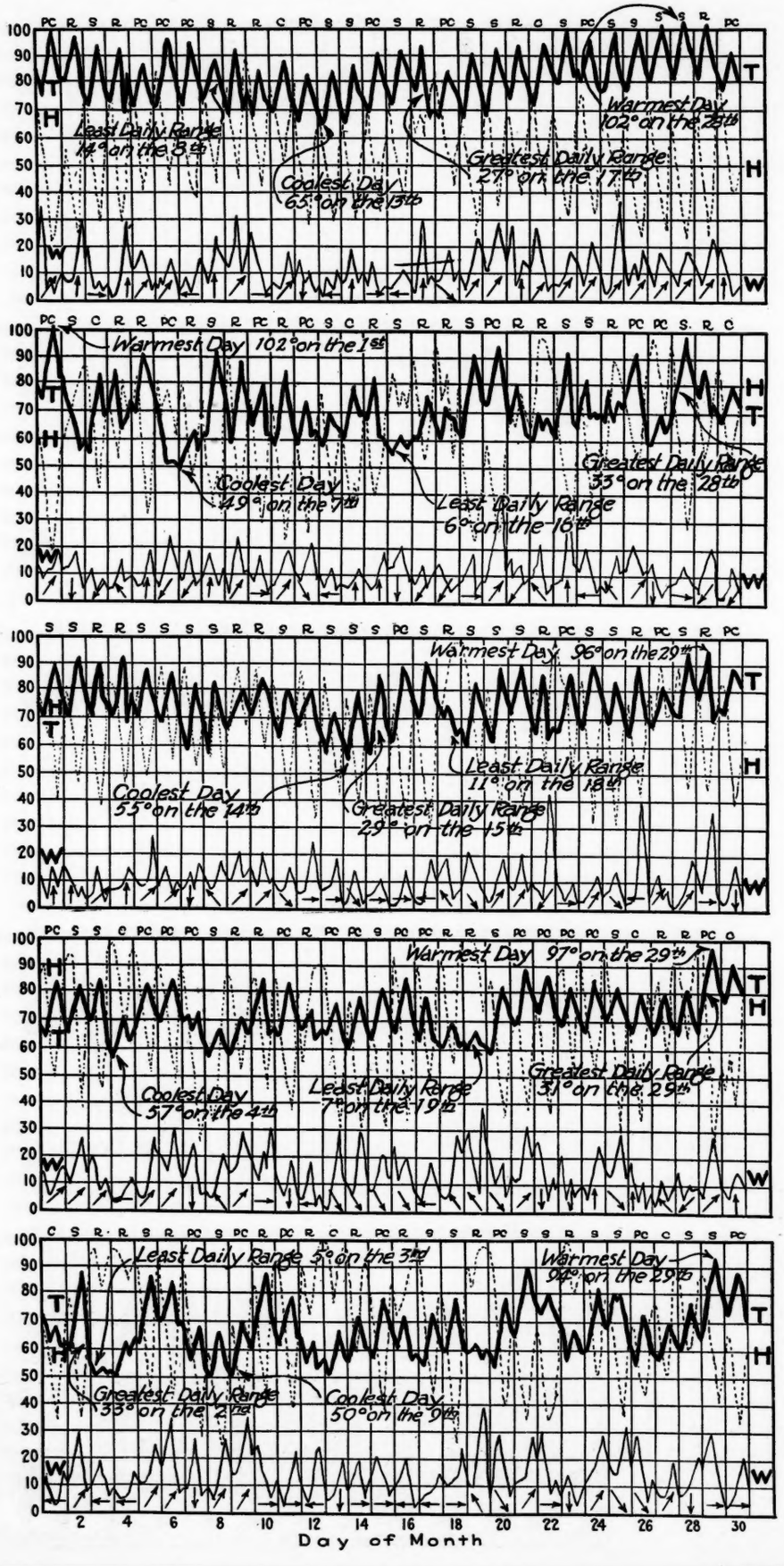
E. B. BADGER & SONS COMPANY, 75 Pitts Street, Boston, Mass.

Atlanta, Ga., 140 Edgewood Ave.
Charlotte, N. C., Independence Bldg.
Chicago, Ill., 2831 S. Parkway.
Cincinnati, Ohio, 514 Main Street
Cleveland, Ohio, Guardian Bldg.
Detroit, Mich., 702 Cadillac Sq. Bldg.
Houston, Tex., 1308 Sec. Nat. Bk. Bldg.
Indianapolis, Ind., 823 Occidental Bldg.
Kansas City, Mo., 1336 Oak Street.
Los Angeles, Cal., 812 Quinby Bldg.
Minneapolis, Minn., 732 Build. Exch.
Montreal, Que., Can. Cement Bldg.
New Orleans, La., 1666 Abundance St.
New York, N. Y., 271 Madison Ave.
Philadelphia, Pa., 1500 Walnut St.
Pittsburgh, Pa., Union Trust Bldg.
Salt Lake City, Utah, Kearns Bldg.
San Francisco, Cal., Sharon Bldg.
Seattle, Wash., Smith Tower.
St. Louis, Mo., 3605 Laclede Ave.
Tulsa, Okla., 409 East Archer Street.

BADGER EXPANSION JOINTS

THE WEATHER FOR JUNE, 1934

Plotted from records especially compiled for HEATING AND VENTILATING by the U. S. Weather Bureau. Heavy curves (T), temperatures in deg. F.; dotted lines (H), per cent relative humidity, from readings at 8 a.m., noon, and 8 p.m., except for New York, which shows hourly readings. Light lines (W), wind velocity in m.p.h. Arrows indicate prevailing wind directions. S—clear; PC—partly cloudy; C—cloudy; R—rain; Sn—snow.


Warmest Day 102° on the 25th
Least Daily Range 14° on the 3rd
Coolest Day 63° on the 13th
Greatest Daily Range 27° on the 17th
Warmest Day 102° on the 1st
Coolest Day 49° on the 7th
Least Daily Range 6° on the 16th
Greatest Daily Range 33° on the 28th
Warmest Day 96° on the 29th
Coolest Day 55° on the 14th
Least Daily Range 11° on the 18th
Greatest Daily Range 29° on the 15th
Warmest Day 97° on the 29th
Coolest Day 57° on the 4th
Least Daily Range 7° on the 19th
Greatest Daily Range 31° on the 29th
Least Daily Range 5° on the 3rd
Warmest Day 94° on the 29th
Greatest Daily Range 35° on the 2nd
Coolest Day 50° on the 9th
T
H
W
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
Day of Month

St. Louis

Mean temp. for month 82.6°; aver. wind velocity, 10.4 m.p.h.; prevailing direction of wind, S.W.

Chicago

Mean temp. for month, 71.6°; aver. wind velocity, 9.7 m.p.m.; prevailing direction of wind, N.E.

Pittsburgh

Mean temp. for month, 75.9°; aver. wind velocity, 8.8 m.p.h.; prevailing direction of wind, S.W.

New York

Mean temp. for month, 72.4°; aver. wind velocity, 13.3 m.p.h.; prevailing direction of wind, S.W.

Boston

Mean temp. for month, 66.9°; aver. wind velocity, 13.1 m.p.h.; prevailing direction of wind, S.W.

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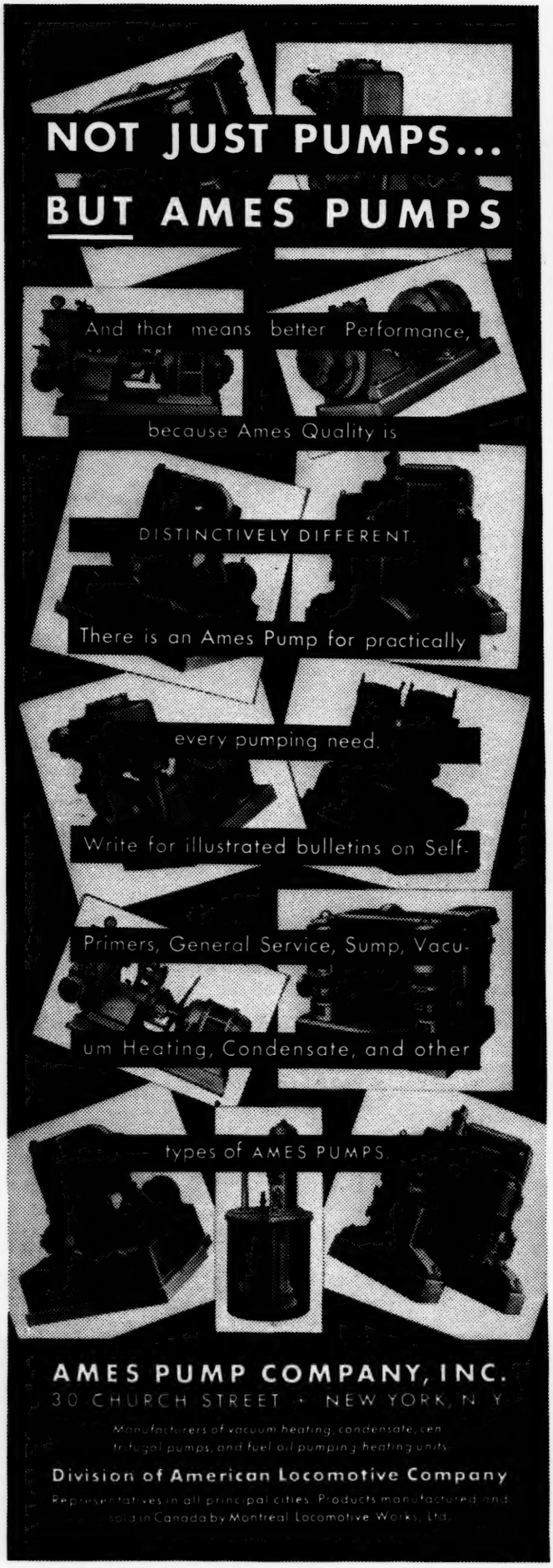
SPECIAL FEATURE now running on **HEATING STOKERS**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Representatives in all principal cities. Products manufactured and sold in Canada by Montreal Locomotive Works, Ltd.

Summer Cooling Data Compiled by Utility Management Company

(Concluded from page 43)

would be closely proportional to the degree-hour excess using 78° as the base temperature. When this base was applied to weather records for New Orleans the following figures resulted.

TABLE 2

Year	Degree-Hours	Year	Degree-Hours
1931	11300	1926	12200
1930	10400	1925	11400
1929	8900	1924	13800
1928	10300	1923	7100
1927	11800	1922	9100

Tables of this kind if available for all cities would place the estimating of cooling loads on a basis much more satisfactory than any now available.

Copper and Brass for Heating Lines

(Concluded from page 39)

facturers have tabulated their recommended sizes for both steam and hot water systems.

In the case of water supply piping where the pressure drops are considerable the Fair-Whipple-Hsiao formula is applicable. In Fig. 1 this formula is solved for water temperatures of 59° and 140°, and can be used for ordinary hot and cold water supply lines.

With so many forms of copper and brass pipe and tubing available it is believed that no engineer or contractor responsible for selection can afford to overlook their possibilities. There are cases where corrosion makes its use advisable regardless of first cost and others where a really careful consideration of all the costs will show that the first cost is not what a casual examination would lead one to suppose.

Abstracts

(Continued from page 51)

if its use is planned when the heating plant is figured so that it may not only save annual fuel costs, but also may pay for parts of its own cost by reducing the cost of the heating plant.

In order to determine the maximum economical thickness of insulation, the report includes a table showing first cost, total heat loss, saving in heat loss and fuel, and the returns on investments, for thickness of rock wool from 1 to 6 in. The figures show a return on the gross cost of 33.6% for the 1-in. thickness and 14.5% for 6 in. Analyzing further, the investment on the second inch of insulation returns 19% on its cost over a 1-in. thickness. The gross investment in the third inch yields 9.5% over 2 in. of thickness, while the investment in the fourth inch pays only 5.5% over 3 in. of thickness. The conclusion is that a 3-in. thickness of rock wool or its equivalent would be the most economical for the conditions assumed, since a return of 5.5% is not particularly attractive.

There are a number of heat losses which may be avoided by care on the part of the occupants. For instance, fireplaces with open dampers or without dampers, will cause a large heat loss. Shutting off radiators and closing doors in rooms that are not being used will often result in considerable savings.

[*"Heat Conservation in Gas Heated Buildings," report of the Subcommittee on Heat Conservation in Gas Heated Buildings, American Gas Association, 420 Lexington Ave., New York. Approximately 3000 words; 5 tables; 2 graphs. Available in booklet form.*]

Real Property Inventory

(Concluded from page 28)

large extent. Zanesville, Lansing and Kenosha use wood hardly at all.

Gas was the most popular fuel in Shreveport and Wichita Falls, while oil is highly popular in Seattle and Nashua.

TYPE OF FUEL

City	Coal	Wood	Gas	Oil	Other
Worcester, Mass.	66.6%	2.6%	0.2%	11.6%	18.5%
Waterbury, Conn.	63.4	3.1	0.2	6.6	26.5
Providence, R. I.	65.9	2.4	0.2	6.1	24.8
Binghamton, N. Y.	96.0	1.2	0.6	2.0	0.2
Syracuse, N. Y.	97.3	0.6	0.6	1.1	0.3
Trenton, N. J.	94.0	1.3	0 2	3.8	0.5
Erie, Pa.	83.2	1.3	3.9	0.7	10.7
Indianapolis, Ind.	96.1	0.3	0.0	1.7	1.7
Peoria, Ill.	94.2	0.2	1.9	2.4	1.2
Minneapolis, Minn.	86.9	2.4	0.2	9.7	0.7
St. Paul, Minn.	87.5	3.2	0.1	8.7	0.4
Des Moines, Ia.	92.8	0.3	1.8	4.8	0.3
Wichita, Kan.	43.1	7.7	46.5	1.9	0.7
Wilmington, Del.	90.1	2.4	0.3	5.7	1.3
Wheeling, W. Va.	82.1	0.2	16.1	0.1	1.2
Atlanta, Ga.	94.1	1.9	2.5	0.5	0.5
Jacksonville, Fla.	22.8	66.1	1.8	1.4	7.7
Birmingham, Ala.	93.2	3.5	0.7	0.1	2.4
Salt Lake City, Utah	85.2	0.4	13.2	0.4	0.6
Seattle, Wash.	37.4	34.0	0.5	26.8	1.1
Portland, Ore.	4.9	72.5	2.8	14.4	5.2

Banks Promote Modernizing

(Concluded from page 28)

and makes a preliminary survey without charge. All financial inquiries are handled by the bank league which puts the customer in touch with his nearest cooperative bank where financial terms are arranged.

All the material dealers cooperating, and this includes several oil burner dealers and manufacturers, home appliance dealers and air conditioning manufacturers get the names of all inquirers and send their own advertising literature. Follow-up is either by local dealers instructed by manufacturers, or by the manufacturers themselves, who turn the sale over to the local retailer, or contractor.

Plans of inquirers in the campaign ranged all the way from repainting the outside of a house, remodelling a kitchen or bathroom to installation of new heating systems and air conditioning. Letters have come from as far as Milford, N. H. In this case the owner of a house over 100 years old wanted to modernize it throughout.

Have You Seen the GLEASON-AVERY TEMPERATURE REGULATOR?

All Electric

LIST PRICE $24.75

All Accessories Included

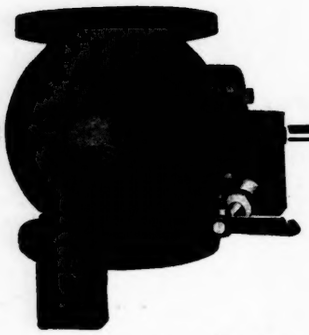
THE SENSATION OF THE 1934 HEATING SEASON

ACCURATE
SENSITIVE
RELIABLE
QUIET

Also available as night-day control with G-E Telechron Time Switch

WRITE FOR DEALER PRICES

GLEASON-AVERY, INC.
27 CLARK STREET
AUBURN, N. Y.

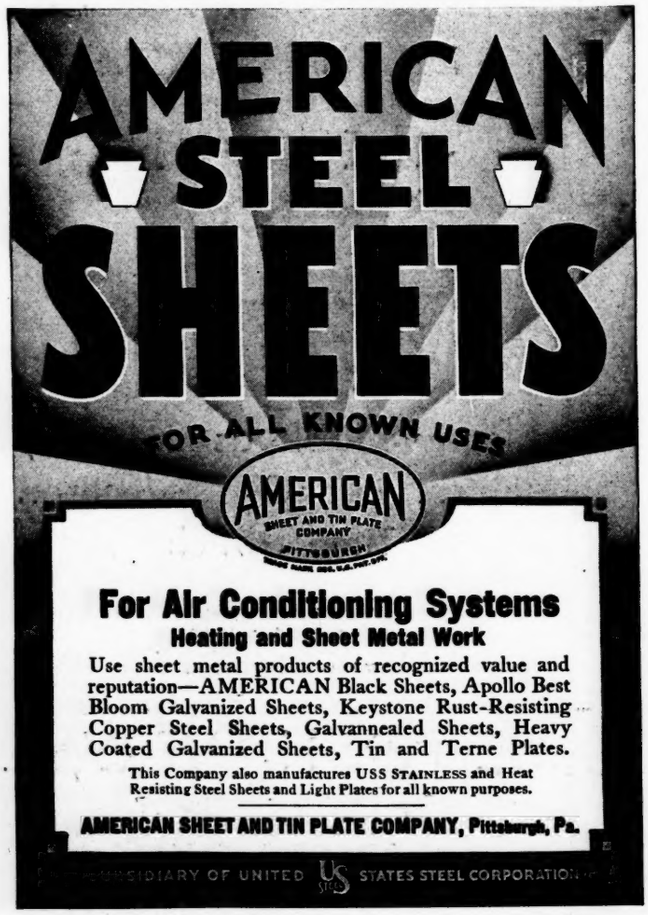


The DAVIS Back Pressure Valve

is the original semi-balanced, noiseless valve with two port openings. One disc of the inner valve partially balances the other. Pressure is maintained by a comparatively small counterweight. The special bronze and iron construction of the seats and inner valve prevent troubles ordinarily caused by expansion. This valve never sticks.

For any application where exhaust steam is used for heating, drying, cooking or other process work, the Davis Back Pressure Valve saves money by saving steam. Specify it for faultless, dependable service.

DAVIS REGULATOR COMPANY
2553 S. Washtenaw Avenue, Chicago, Ill.


AMERICAN
STEEL
SHEETS
FOR ALL KNOWN USES
AMERICAN
SHEET AND TIN PLATE COMPANY
PITTSBURGH
For Air Conditioning Systems
Heating and Sheet Metal Work
Use sheet metal products of recognized value and reputation—AMERICAN Black Sheets, Apollo Best Bloom Galvanized Sheets, Keystone Rust-Resisting Copper Steel Sheets, Galvannealed Sheets, Heavy Coated Galvanized Sheets, Tin and Terne Plates.
This Company also manufactures USS STAINLESS and Heat Resisting Steel Sheets and Light Plates for all known purposes.
AMERICAN SHEET AND TIN PLATE COMPANY, Pittsburgh, Pa.
SUBSIDIARY OF UNITED STATES STEEL CORPORATION

Mechanical Features of Stokers

(Concluded from page 23)

that the anthracite burners are practically all available with round retorts to facilitate putting them into round boilers or furnaces but that some of the smallest bituminous stokers are not available with round retorts. The anthracite burners run strongly to providing a means of removing ash mechanically while the bituminous depend on hand removal through the firing door after the ash has been clinkered. Two manufacturers have a means of mechanically conveying anthracite coal from the bin directly to the burner and one of them includes this feature on his bituminous burner. Control is almost always through a room thermostat. Hoppers are usually provided with a cover.

Much the same procedure can be used to isolate out the principal characteristics of other special groups.

The tables can also be used in connection with the accompanying chart when questions arise concerning necessary coal-burning capacity to handle known amounts of radiator surface. With a coal of known heat value and with stated efficiency of stoker and boiler, the pounds of coal per hour necessary to handle a given radiator load can be found. Working from the maximum coal handling capacity given in the tables, the radiator load which any given model can handle can be approximated closely enough for preliminary work. Other uses for the tables will suggest themselves readily once their form and scope is clear.

Contractors' Code Approved

(Continued from page 48)

with the submitting of bid or bids file copies of his bid or bids and all revisions thereof with an impartial depository designated by the Divisional Code Authority or its authorized representative; the same to be kept sealed and confidential until twenty-four (24) hours after bids are due or until after the letting of the contract, following which the low or successful bid may be disclosed to the bidders, except that a committee of review may have confidential access to the files of bid depositories.

(o-3) In the case of combination bids, or revisions thereof, the bid for the work not included in this Division shall be separate and distinct from any bid for work within this Division, and the combination bid shall be the aggregate of said separate and distinct bids.

(o-4) Each bid filed in accordance with paragraph (o-2) of this Section shall be accompanied by a fee of one dollar ($1.00). For the purposes of this paragraph, identical (except for name and address of recipient) copies of the same bid given to different parties for the same job shall be construed as one bid. The Divisional Code Authority shall use funds so received to pay the expenses of operating bid depositories. Account of the receipts and expenditures of bid depositories shall be kept and the same shall be open to the Administrator, or his representatives, for inspection.

(o-5) Upon request of any bidder a committee shall

be appointed by the Divisional Code Authority or its authorized representative, which committee shall be empowered to investigate any bid to determine whether any provisions of this Code have been violated in such bid. In the event such committee shall find the rules of fair competition have been violated, the violation shall be reported to the Divisional Code Authority for such action as it deems proper in accordance with this Code, including in appropriate cases, with the approval of the Administrator, report to the Federal District Attorney or the Federal Trade Commission.

Article V—Postings

Copies of Chapter I and this Chapter shall be kept continuously posted from the time of effective date in a conspicuous place in the office or shop of each member of this Division.

Article VI—Modification

Subject to the provisions of Article IV, B., Section 2 (c), of Chapter I hereof, the provisions of this Chapter except as to provisions required by the Act, may be modified on the basis of experience or changes in circumstances, such modifications to be based upon application to the Administrator and such notice and hearing as he shall specify, and to become effective on his approval. Any such application may be made by the Divisional Code Authority.

Article VII—Reference to Provisions of Chapter I

The provisions of Sections 7 (a) and 10 (b) of the Act, which are set forth in Sections 1 and 6 respectively of Article VIII of Chapter I of this Code, are specifically incorporated herein by reference with the same force and effect as if set forth herein in full; all other provisions of Chapter I of this Code, except as herein provided, apply within this Division with the same force and effect as if set forth herein in full.

Article VIII—Effective Date

This Code shall become effective in this Division on the fifteenth (15) day after its approval by the President.

NEW CATALOGS

The Holtzer-Cabot Electric Co., 125 Amory St., Boston, Mass. A 14-page bulletin entitled "Motors for Domestic Stokers" describing the construction and features, and giving dimensional data of the company's line of repulsion induction motors for start-and-stop stokers.

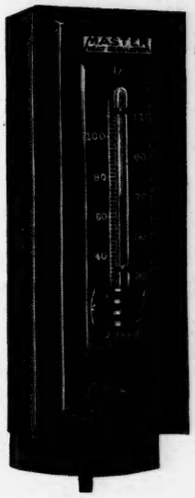
Penn Electric Switch Co., Des Moines, Iowa. Forty-two pages, standard size, loose-leaf, black-jacketed catalog, containing complete specifications on the company's Temtrol system of temperature regulation and other automatic switches for the control of heating equipment. The catalog includes a schedule of prices and a special offer on the company's new display demonstrator set. Included also is an eight-page article by L. M. Persons, chief engineer, and Nelson B. Delavan, sales manager, describing the advantages of the Temtrol system.

B. F. Sturtevant Co., Hyde Park, Boston, Mass. Catalog No. 398, "Air Conditioning for Comfort," illustrating the numerous and varied types of installation using Sturtevant central air conditioning systems. Standard size; 16 pages.

A PROPOSITION
YOU SHOULD INVESTIGATE

The dealer who has survived business conditions of the past few years has done so by making a profit on his materials, as well as on his time. His jobs have not had to be done over. His public could not get better equipment of someone else.

If you are such a dealer we have a proposition for you.



Type 144

MASTER Heat Regulators give you double profit—a good margin on the regulator itself, and also on the installation. It is easy to install.

Once installed the job is done. No time wasted later in trying to make it work. It is built for long-time use, with platinum-iridium contact points. It is made by a well known and respected pioneer in the industry.

Every installation is a salesman. Its action is so quick and dependable and its operation so noiseless that it exceeds the customer's expectations. He'll refer his friends to you. They in turn will do the same.

You are dealing with choosy critical people, nowadays. We have the heat regulator that will satisfy them—absolutely. Let's get together. *Write today for our proposition.*

WHITE MANUFACTURING CO.
2362 University Avenue **ST. PAUL, MINNESOTA**

MASTER HEAT REGULATOR

MAKERS OF COPPER TUBING STANDARDIZE ON 3 TYPES:

Leading manufacturers of copper tubing have agreed to standardize on three types—K, L, M. Users of copper tubing everywhere will appreciate the greatly increased *convenience* this represents.

* * *

The types are:—*Type K,* for underground services and general plumbing purposes with severe conditions. *Type L,* for general plumbing purposes. *Type M,* for general plumbing purposes with soldered fittings only and for normal water conditions.

MEET STANDARD SPECIFICATIONS

All three types conform to all requirements of the Federal and A. S. T. M. specifications. The copper used is 99.9% pure copper. It can't rust.

Copper tubing is very practical for replacement work, but can be used profitably in many other kinds of work as well.

Copper tubing assembled with threadless connections enables the contractor to offer quality rust-proof jobs at a price competitive with rustable installations.

HOIT, PRICE & BARNES . .

say Service Records point where

Wrought Iron should be specified

PIPE selection has reached a high state of accuracy in the offices of leading architects. The procedure embraces two major steps, both based on sound engineering: — First, the determination of the conditions under which the pipe must serve and, second, the selection of the pipe material that has the longest, economical record under those conditions.

May we call your attention to an example of how this practice, which we call "Pipe Prescription," is followed by Hoit, Price & Barnes of Kansas City.

In the buildings illustrated, wrought iron was specified for certain corrosive services on its record in similar services in older buildings.

We will gladly furnish you with authentic service records, review other examples of "Pipe Prescription" and assist you in analyzing pipe service conditions.

Ask a Byers Engineer or write our Engineering Service Department. A. M. Byers Company, Established 1864. Pittsburgh, Boston, New York, Philadelphia, Washington, Chicago, St. Louis, Houston, Los Angeles.

Examples of "Pipe Prescription"
HOIT, PRICE & BARNES, Kansas City Architects

nuine Wrought Iron Pipe specified for cold , drinking water and waste lines, and vents and s; also for heating supply and return lines Telephone Building, Kansas City. — L. R. Timlin, iate Architect.

● In the Nurses' Home, Children's Mercy Hospital, Kansas City, Genuine Wrought Iron Pipe was specified for hot and cold water and waste lines, and vents and drains; also heating supply and return lines.

● Genuine Wrought Iron Pipe was specified for the cold water, drinking water, waste and fire lines, and vents and drains; also concealed heating supply, all returns and in refrigeration lines in the Kansas City Power & Light Co. Building.

BYERS GENUINE WROUGHT IRON PRODUCTS

PIPE · WELDING FITTINGS · RIVETS · BUTTONS · CHAIN
PLATES · SHEETS · CULVERTS · FORGINGS · BOILER · STRUCTURAL

OVER 80 YEARS' BYERS